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Monthly Report

March 1990 Number 259

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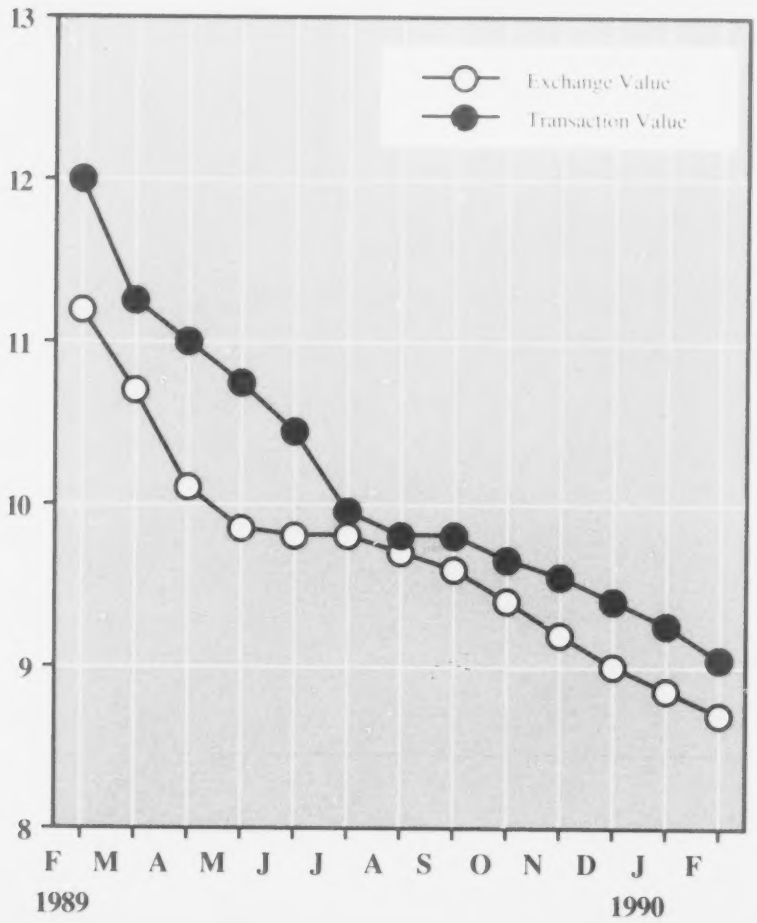

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NUEXCO MONTHLY REPORT
March 1990, No. 259

EXECUTIVE SUMMARY
(As of February 28, 1990)

Exchange Value
$8.70, down $0.15

The **Exchange Value** is **$8.70** per pound U_3O_8, down $0.15 from the previous month.

UF_6 Value
$25.25, down $0.65

The **UF_6 Value** is **$25.25** per kg U as UF_6 this month, a $0.65 decrease from last month's UF_6 value of $25.90.

Uranium Sales; Supply and Demand

Eight recent **natural uranium** sales involving **3.0 million** pounds equivalent U_3O_8 are reported during a very active February. All of these sales involved spot or near-term delivery and met the conditions for inclusion in the Transaction Value. Active spot and near-term **uranium supply** amounts to **5.1 million** pounds U_3O_8 equivalent, down from 6.2 million pounds at the end of January. Active spot and near-term **uranium demand** totals **3.7 million** pounds, compared to 2.5 million pounds last month. The spot and near-term **supply-demand ratio** is **1.4 to 1**, down from the prior month's 2.5 to 1.

Transaction Value
$9.05, down $0.20

The **Transaction Value** is **$9.05** per pound U_3O_8, down $0.20 from last month. The calculation includes 22 transactions involving a total of 5.8 million pounds U_3O_8 equivalent over a period of three months.

Loan Rate
3.5%, unchanged

The **Loan Rate** is **3.5 percent** per annum, as has been the case for 28 consecutive months. Four natural uranium loans are reported, involving over 1.5 million pounds U_3O_8 equivalent.

Conversion Value
$1.50, unchanged

The **Conversion Value** is unchanged at **$1.50** per pound U as UF_6. No transactions for conversion services are reported.

SWU Value
$50, down $4

The **SWU Value** decreased $4 to **$50** per SWU. Two SWU sales are reported. Active supply decreased from 665 to 415 thousand SWU, and active demand dropped from 400 to 265 thousand SWU.

* * *

Perestroika and the Mining Industry

Perestroika in the Soviet Union and Eastern Europe will necessitate some restructuring of the mining industry of the Western world. Tremendous opportunities will be available to companies that adapt most readily.

Technical Analysis in Short-Term Uranium Price Forecasting

Given the relatively small field of uranium price data points, technical analysis, as applied to other commodities, should not be directly applied to uranium. However, due to the basically non-random nature of past uranium price movements, technical analysis may help anticipate future price trends.

Major Issues Facing Research Reactor Operators

Over 300 research reactors operate in more than fifty countries. Unless serious issues in the areas of supply availability, reactor design, reprocessing, and spent fuel storage are resolved soon, several could suffer temporary suspension of operation. They may also have to seek new sources of high-enriched fuel, as well as new storage facilities for spent fuel.

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NUEXCO MONTHLY REPORT 259 FIGURES OF THE MONTH (February 28, 1990)	This Month (Report 259)	Last Month (Report 258)	12 Months Ago (Report 247)
Exchange Value ($US per pound U_3O_8)	8.70	8.85	11.20
UF_6 Value ($US per kg U as UF_6)	25.25	25.90	34.00
Transaction Value ($US per pound U_3O_8 equivalent)	9.05	9.25	12.00
Loan Rate (Per Annum)	3.5%	3.5%	3.5%
Conversion Value ($US per pound U as UF_6)	1.50	1.50	1.95
Near-Term Uranium Supply[1] (millions of pounds U_3O_8)	5.1	6.2	6.2
Near-Term Uranium Demand[2] (millions of pounds U_3O_8)	3.7	2.5	3.1
Near-Term Supply-Demand Ratio	1.4	2.5	2.0
Recent Uranium Sales:[3]			
Number of Transactions	17	6	8
Quantity of Material (Millions of pounds U_3O_8 equivalent)	15.1[4]	5.1	6.5
Nuexco SWU Value: ($US per SWU)			
at 0.3 tails assay	50	54	67
US DOE SWU Prices: ($US per SWU)			
USEC	117.85[5]	117.85[5]	117.00[6]
AFC	153.00[7]	153.00[7]	153.00[7]
Requirements	157.00[7]	157.00[7]	157.00[7]
Incentive Price (IP1)	90.00[8]	90.00[8]	90.00[8]
Market Value of Enriched UF_6[9]**:** ($US per kg U as UF_6)			
2.5 w/o U_{235}	266	279	350
3.0 w/o U_{235}	342	359	450
3.5 w/o U_{235}	420	440	552
4.0 w/o U_{235}	498	523	656

[1] Active inquiries to sell, for delivery within 12 months after contract signing.
[2] Active inquiries to purchase, for delivery within 12 months after contract signing.
[3] Uranium sales only; does not include loans, conversion, or SWU transactions.
[4] Includes 8 transactions concluded prior to February 1, 1990.
[5] Effective 10/1/89 to 9/31/90.
[6] Effective from 10/1/87 to 9/31/89.
[7] Effective since 10/1/84.
[8] Effective from 10/1/86 to 9/31/90, for up to 30% of annual requirements. DOE chose to waive application of the GNP deflator for FY87-FY90 deliveries.
[9] Calculated using the NUEXCO Exchange Value, Conversion Value, SWU Value and 0.30 percent tails assay.

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NUEXCO Monthly Report

March 1990
No. 259

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Annual Review, Uranium Market Study; International Directory of Nuclear Utilities (IDNU), International Directory of Uranium Producers (IDUP)

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To Our Readers

We are pleased to announce that Mr. **R. Scott Lumadue** has joined the NUEXCO organization.

Since 1981, Scott has worked in the purchasing department of Duke Power Company, progressing to his most recent position as Purchasing Agent for Nuclear Fuel Purchasing. Prior to his move to purchasing, Scott worked in Duke's Steam Production Department. Scott earned his BS degree in Accounting from Appalachian State University in 1977.

Based in Denver, Scott will be responsible for Contract Administration and trading support for NUEXCO Trading Corporation.

* * *

NUEXCO will be hosting a hospitality suite at the US Council for Energy Awareness Fuel Cycle '90 Conference to be held March 25-28 in Nashville, Tennessee. We look forward to seeing you there.

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MARKET VALUES SUMMARY
February 28, 1990

Market Values	This Month (Report 259)		Active Supply* (thousands pounds equivalent U_3O_8)	Active Demand*
EXCHANGE VALUE[1]	$8.70/lb U_3O_8			
UF$_6$ VALUE[2]	$25.25/kg U as UF$_6$		5,140**	3,720**
LOAN RATE[3]	3.5%/annum		6,920	0
CONVERSION VALUE[4]	$1.50/lb U as UF$_6$		990	560
SWU VALUE[5] 0.3 tails assay:	$50/SWU		415	265
TRANSACTION VALUE[6]	$9.05 Per Pound U_3O_8	22 Transactions	3 Months	5.8 Million Pounds

* Supply and demand tables in the *Current Market Data* section of this Report detail the numbers for each category.

** Includes uranium concentrates and uranium hexafluoride.

DEFINITIONS

1 The **Exchange Value** is NUEXCO's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.

2 The **UF$_6$ Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.

3 The **Loan Rate** is NUEXCO's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.

4 The **Conversion Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.

5 The **SWU Value** is NUEXCO's judgment of the price at which spot and near-term transactions for significant quantities of enrichment services could be concluded as of the date indicated.

6 The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:

a. Transactions closed within the previous three month period for which delivery is scheduled within one year of the transaction date;
b. At least ten transactions;
c. Transactions involving a sum total of at least 2 million pounds U_3O_8 equivalent.

DERIVATIONS AND COMMENTS

- All **Market Values** are based on:
  - Data from recently completed transactions.
  - Data from pending transactions.
  - Firm bids to buy or borrow, and firm offers to sell or lend.
  - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which NUEXCO is not aware of firm bids to buy or borrow and prices sellers or rates lenders have expressed a willingness to accept, but for which NUEXCO is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these **Market Values**.
- In the determination of prices, NUEXCO does not consider charges for transportation other than that customarily provided by suppliers.
- The prices of services or materials delivered under long-term contracts with primary suppliers are not considered in the determination of the listed values.
- For the **SWU Value**, NUEXCO converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight percent U^{235} and a product assay of 3.0 weight-percent U^{235}, assuming feed costs corresponding to the NUEXCO **Exchange Value** and **Conversion Value** determined as of the same date.
- In calculating the **Transaction Value**, NUEXCO does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future **Exchange Values** or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it can not currently be determined.
- The sample time for the **Transaction Value** is extended as necessary to satisfy the minima for the number of transactions and quantity of material. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

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PRICING

FEBRUARY MARKET REVIEW

(as of February 28, 1990)

NATURAL URANIUM AND CONVERSION

Short-term Market Activity

Intense competition for sales led to declines in most NUEXCO Market Values in a very active month of trading. Both the spot and long-term markets generated high sales volume in February. Nearly three million pounds equivalent U_3O_8 changed hands in eight near-term uranium sales. Six involved natural uranium concentrates, one involved UF_6, and the other enriched uranium product (EUP). In addition, several inquiries and offers are pending. In other markets, four natural uranium loans and two enrichment sales are reported.

Seven short-term uranium sales concluded in December or January are also reported. They amounted to approximately 1.3 million pounds equivalent U_3O_8, and are not included in the February market volume totals. Six of those will be posted in the totals reported in the *1989 Annual Review*; the seventh, a very small UF_6 sale, will be included in the 1990 totals.

The **Exchange Value** fell to **$8.70** per pound U_3O_8, down almost two percent from $8.85 on January 31. Spot market volume increased significantly, as market participants pursued opportunities more vigorously than in recent months. Some of the recent purchases may be due to perceptions by some buyers that the market may be nearing its bottom. Six spot yellowcake sales occurred at or near the February 28 Exchange Value.

Heavy sellers' competition for each opportunity continues to exert downward pressure on the market. Producers have also become an important force in the marketplace, by borrowing or buying material in order to fulfill long-term commitments. This trend has been developing gradually, and recent months have seen substantial volumes and numerous transactions with producers in previously non-traditional roles as buyers or borrowers.

The **UF_6 Value** declined to **$25.25** per KgU as UF_6, down $0.65. One large UF_6 sale to a producer is reported this month. The UF_6 Value is under additional pressure from competitive EUP sales. While adequate supplies of EUP remain available, recent transactions have reduced inventory levels somewhat.

* * *

The **Transaction Value** dropped to **$9.05** per pound U_3O_8, based on 22 qualifying sales totalling 5.8 million pounds over a three-month period.

* * *

Active Supply of natural uranium declined to **5.1 million** pounds equivalent U_3O_8, from 6.2 million pounds on January 31. **Active Demand** for natural uranium increased to **3.7 million** pounds equivalent U_3O_8, from 2.5 million pounds. The **Supply/Demand Ratio** dropped to **1.4** compared to the January 31 ratio of 2.5.

* * *

The **Loan Rate** remains unchanged at **3.5 percent** per annum. Four loans amounting to over 1.5 million pounds occurred at or near the February 28 Loan Rate. The loans involved two producers, an intermediary, and a utility as lenders. Natural uranium loan supply remains abundant. Large quantities of material are being loaned to meet immediate supply obligations. Borrowers are covering their return obligations through medium-term purchases or planned production. This trading activity is one of the numerous ways in which the liquidation of excess inventories in all segments is driving the nuclear fuel market.

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The **Conversion Value** also remains unchanged at **$1.50** per pound U as UF_6. Market activity was very light in this sector; no spot conversion sales are reported. One long-term sale by a converter, which occurred in late 1989, is listed under Conversion Transactions on page 10.

Long-term Market Activity

The long-term natural uranium market was very active as well; most sales involved US utilities as buyers. Nine long-term sales, totalling over 12 million pounds equivalent U_3O_8, all based on market-related pricing, were concluded in February. Competition remains intense in this market also; aggressive sellers are eager to pursue this recent reawakening of demand for long-term supplies.

One utility issued letters of intent to several different sources, including producers and intermediaries, for long-term supply contracts. One long-term UF_6 sale that occurred in December is reported in this month's transactions. It will be included in the totals published in the *1989 Annual Review*.

* * *

ENRICHED URANIUM PRODUCT AND ENRICHMENT SERVICES

Current Market Activity

The **SWU Value** dropped $4 to **$50** per SWU. US utilities made one SWU purchase and one EUP purchase; three additional SWU sales are pending.

The current activity is largely attributable to the liquidation of substantial inventories of EUP. Some EUP sales involve inventories held by utilities and others that have no actual needs. With the present market situation, demand for EUP rather than its components is increasing. Nevertheless, more utilities are becoming interested in the SWU spot market.

The surge of inventories into the marketplace has pushed SWU market prices down to such a level that market economics are being reexamined. The low SWU market prices, coupled with the perception of abundant long-term SWU supplies from the worldwide enrichment overcapacity, has led several utilities to consider the cost of terminating portions of their long-term enrichment contracts. In particular, some DOE customers have become dissatisfied with the terms of their Utility Services Enrichment Contracts (USEC). While some are evaluating the economic impact of termination, others are considering legal challenges to the contract itself.

Interpretation of the USEC

Although the validity and interpretation of the Department of Energy's (DOE) USEC have been discussed since the contract was first introduced in 1984, customers have never seriously challenged the interpretations set forth by DOE. However, several developments have led some of DOE's utility customers to reconsider their rights and obligations under the contract. The following discussion reports some of those utilities' concerns.

- DOE has unilaterally taken new steps to restrict the freedom of USEC holders. For example, utilities that are 100% DOE customers are no longer able to use the separative work (SWU) that they take from DOE to upgrade enriched uranium. That restriction reduces the value of DOE SWU to such utilities that have access to enriched feed material.

- For the first time in the history of the commercial nuclear fuel market, the ability for utilities to purchase fabricated fuel is now becoming widely available. Several fuel fabricators hold large inventories of EUP and can offer later EUP fuel delivery dates, or even sell EUP directly to the utility. It is not clear how DOE would apply such transactions against the requirements in each customer's USEC.

- DOE is selling SWU to 70% customers for a full price of about $120, and that price is expected to rise to $140. Current spot market prices are in the neighborhood of $50. Regulatory authorities are

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putting increased pressure on utilities to reduce costs, such that price differentials can become embarassing.

- The DOE program, Atomic Vapor Laser Isotope Separation (AVLIS), that was projected to enrich uranium at costs substantially below the current market price, remains an unproven technology without a firm deployment schedule. The previous DOE program, the Gas Centrifuge Enrichment Plant, was scrapped after billions of dollars had been spent. But in the hands of Soviet, European, and Japanese suppliers, this same gas centrifuge technology appears to be capable of lower cost production than DOE's aging diffusion plant technology.

- The delays in DOE's spent fuel disposal program have cast doubt on DOE's ability to manage large technical projects such as AVLIS.

- Finally, some utilities and industry associations have hired outside legal counsel to review the USEC, and their opinions seem to suggest that the utilities may have more freedom under the contract than they have exercised in the past.

Requirements

The most significant interpretation issue is the requirement for a utility to purchase enrichment services from DOE. This issue has two important areas of uncertainty. The first is the definition of requirements. What is a requirement for enrichment services and when does the requirement arise? When DOE was the only source, requirements for enrichment were much easier to determine. Even then, however, there were other questions. How is a damaged fuel bundle treated? Are fabrication losses a requirement if the fabricator is responsible for the lost material? Now that utilities can purchase enriched uranium, fabricated fuel, or electrical power generated by nuclear fuel, the question of when a utility has a requirement is debatable.

The timing question was difficult to deal with in the past and is even more so now. Past practices seemed to indicate that a utility must recognize a requirement when the fabrication contract required delivery of enriched feed. That practice did not work well in the past, when it did not have to deal with inventories, loans, or special contractual provisions. Now it is even more difficult. Fabricators hold large inventories of enriched uranium, enabling utilities to delay the requirement to deliver feed material for long periods of time or to reduce the requirement to zero by purchasing fabricated fuel.

The second important area of uncertainty is the question of how a utility can use its enrichment services once a requirement has been recognized. Enriched uranium from various sources is available at low prices, but it sometimes needs to be upgraded to an appropriate assay. Utilities could gain a significant cost savings if, rather than suffering the economic penalty associated with blending, they could use enrichment services to upgrade. DOE allowed this in the past. Utilities could profit from the sale of DOE-origin enrichment to other utilities that wanted DOE material. In its place, they could substitute lower cost material with the same or better isotopic and chemical specifications. DOE now denies 100% customers this practice.

Termination Charges

Are the charges demanded by DOE valid termination charges or an illegal forfeiture? The 70% DOE customers face a different situation than the 100% or Incentive Price (IP) customers. The IP has been described as a contract based on marginal cost and, if that is true, some IP customers may argue that their legally enforceable termination charges may be different from the charges that could be assessed on others.

Equal Treatment

What is DOE's responsibility to ensure equal treatment? Has DOE met the standards? Outside counsel who offer a pledge of confidentiality may not be allowed to verify equal treatment by reviewing the DOE contracts. Does the requirement that the West German national stockpile not be offered by DOE to US utility customers violate the standard? Who has been allowed to upgrade in the past? Who has not? The question of equal treatment prompts a number of other questions.

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Cost Projections

DOE has used cost projections as a marketing tool. Some customers may argue that they were misled by those cost projections. Some utility fuel managers are interested in examining the legal ramifications of using such projections in marketing, as well as the utility's rights if such projections were, in a legal sense, incorrect, negligent, or fraudulent.

Pricing and Cost Accounting

Utilities now deal with a contract that has a ceiling price determined by the sum of various costing formulae. The largest component of the ceiling price formula is the average power cost, which is equal to one quarter of the preceding fiscal year's power cost. Some customers are concerned that this component could be subject to manipulation by DOE. DOE's cost accounting has been criticized by the General Accounting Office (GAO) and the Congressional Research Service, as well as by utilities. Consequently, some utilities want to become more involved in such cost accounting.

Conclusion

The history of enrichment contracting is one of periodic adaptation to changes in market conditions, usually in response to customer requests. The US Atomic Energy Commission (now DOE) offered requirements contracts between 1968 and 1972. For the next ten years or so, fixed commitment contracting dominated the market, first as the Long-term Fixed-commitment Contract (LTFC), then as the Adjustable Fixed-commitment Contract (AFC) in 1978. In August 1982, DOE introduced the draft Facility Requirements Contract, which later evolved into the USEC and was first offered in January 1984.

DOE's competition has come from Eurodif (since 1979), Urenco (since 1976), and the Soviet Union (since 1973). After initially concentrating on Europe and Asia, DOE's competitors have become more aggressive during the life of the USEC, substantially increasing their penetration of DOE's domestic market. Further competition from the emerging Louisana Energy Services and Isotope Technologies may arise in the mid-1990's. Inasmuch as DOE enrichment contract forms have a useful commercial life of four to six years, and inasmuch as the USEC is now more than six years old, perhaps DOE should consider the development of a new contract paying close attention to its customers' current needs. ■

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CURRENT MARKET DATA

MARKET VALUES EXPRESSED IN SELECTED CURRENCIES

EXCHANGE VALUE

Country (currency)	per lb U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)
Australia (dollar)	11.47	11.58	14.07	29.82	30.10	36.58
Belgium (comm. franc)	306.01	313.27	427.64	795.57	814.44	1,112
Canada (dollar)	10.39	10.52	13.46	27.01	27.34	34.99
EEC (ecu)	7.19	7.28	9.78	18.68	18.94	25.43
Finland (markka)	34.51	35.49	47.82	89.73	92.26	124.33
France (franc)	49.69	51.14	69.39	129.19	132.96	180.41
Italy (lira)	10,860	11,204	20.38	28,234	29,128	52.98
Japan (yen)	1,293	1,286	15,032	3,362	3,343	39,079
Netherlands (guilder)	16.54	16.99	1,418	43.01	44.18	3,687
So. Africa (comm. rand)	22.21	22.55	23.04	57.73	58.62	59.60
Spain (peseta)	944.42	967.11	27.78	2,455	2,514	72.22
Sweden (krona)	53.08	54.90	1,278	138.00	142.73	3,322
Switzerland (franc)	12.91	13.31	70.26	33.55	34.60	182.67
UK (pound)	5.15	5.28	17.39	13.38	13.73	45.22
US (dollar)	8.70	8.85	6.44	22.62	23.01	16.74
West Germany (mark)	14.68	15.06	11.20	38.15	39.16	29.12

TRANSACTION VALUE

Country (currency)	per lb U_3O_8 as Concentrates			per kg U as Concentrates		
	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)
Australia (dollar)	11.93	12.10	15.08	31.02	31.46	39.19
Belgium (comm. franc)	318.33	327.43	458.19	827.58	851.25	1,191
Canada (dollar)	10.81	10.99	14.42	28.09	28.58	37.49
EEC (ecu)	7.48	7.61	10.48	19.43	19.79	27.24
Finland (markka)	35.90	37.09	51.24	93.34	96.43	133.21
France (franc)	51.69	53.46	74.35	134.39	138.97	193.29
Italy (lira)	11,297	11,710	21.83	29,370	30,444	56.76
Japan (yen)	1,345	1,344	16,105	3,498	3,494	41,870
Netherlands (guilder)	17.21	17.76	1,519	44.74	46.17	3,950
So. Africa (comm. rand)	23.10	23.57	24.69	60.05	61.27	64.18
Spain (peseta)	982.41	1,011	29.76	2,554	2,628	77.37
Sweden (krona)	55.22	57.38	1,369	143.55	149.18	3,560
Switzerland (franc)	13.43	13.91	75.28	34.90	36.17	195.72
UK (pound)	5.36	5.52	18.64	13.92	14.35	48.45
US (dollar)	9.05	9.25	6.90	23.53	24.05	17.93
West Germany (mark)	15.27	15.74	12.00	39.69	40.93	31.20

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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CONVERSION VALUE

Country (currency)	per lb U as UF_6			per kg U as UF_6		
	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)
Australia (dollar)	1.98	1.96	2.45	4.36	4.33	5.40
Belgium (comm. franc)	52.76	53.10	74.46	116.32	117.06	165.15
Canada (dollar)	1.79	1.78	2.34	3.95	3.93	5.17
EEC (ecu)	1.24	1.23	1.70	2.73	2.72	3.75
Finland (markka)	5.95	6.01	8.33	13.12	13.26	18.36
France (franc)	8.57	8.67	12.08	18.89	19.11	26.64
Italy (lira)	1,872	1,899	3,55	4,128	4,187	7.82
Japan (yen)	222.98	217.96	2,617	491.59	480.52	5,770
Netherlands (guilder)	2.85	2.88	246.90	6.29	6.35	544.32
So. Africa (comm. rand)	3.83	3.82	4.01	8.44	8.43	8.84
Spain (peseta)	162.83	163.92	4.84	358.98	361.37	10.66
Sweden (krona)	9.15	9.31	222.50	20.18	20.51	490.53
Switzerland (franc)	2.23	2.26	12.23	4.91	4.97	26.97
UK (pound)	.89	.89	3.03	1.96	1.97	6.68
US (dollar)	1.50	1.50	1.12	3.31	3.31	2.47
West Germany (mark)	2.53	2.55	1.95	5.58	5.63	4.30

SWU VALUE AND UF_6 VALUE

Country (currency)	SWU Value at 0.30% Tails Assay			UF_6 Value per kg U as UF_6		
	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)	This Month (Feb 28, 1990)	Last Month (Jan 31, 1990)	12 Months Ago (Feb 28, 1989)
Australia (dollar)	65.92	70.63	84.17	33.28	33.87	42.71
Belgium (comm. franc)	1,759	1,912	2,558	888.14	916.81	1,298
Canada (dollar)	59.70	64.18	80.51	30.14	30.78	40.85
EEC (ecu)	41.30	44.45	58.50	20.85	21.31	29.68
Finland (markka)	198.35	216.54	286.08	100.16	103.85	145.17
France (franc)	285.60	312.07	415.12	144.22	149.67	210.65
Italy (lira)	62,414	68,363	121.91	31,519	32,789	61.86
Japan (yen)	7,433	7,847	89,921	3,754	3,763	45,631
Netherlands (guilder)	95.08	103.69	8,483	48.01	49.73	4,305
So. Africa (comm. rand)	127.62	137.58	137.83	64.44	65.98	69.94
Spain (peseta)	5,428	5,901	166.17	2,741	2,830	84.32
Sweden (krona)	305.06	334.99	7,645	154.05	160.66	3,880
Switzerland (franc)	74.17	81.22	420.33	37.45	38.95	213.29
UK (pound)	29.59	32.22	104.05	14.94	15.45	52.80
US (dollar)	50.00	54.00	38.52	25.25	25.90	19.54
West Germany (mark)	84.35	91.91	67.00	42.59	44.08	34.00

[1]Calculated using currency exchange rates published in *The Wall Street Journal* on the last working day of the month.

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CURRENT MARKET DATA

RECENT TRANSACTIONS

URANIUM SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U_3O_8 equivalent)	Approximate Price Range[2] as Percent of Current Exchange or UF_6 Value	Seller	Buyer	Remarks
4721	1990-91	301-600	R[3]	Producer	Utility	UF_6, Occurred in Late 1989
4722	1990	301-600	R[3]	Producer	Utility	UF_6, Occurred in Late 1989
4737	1990	50-100	103-107	Intermediary	Utility	Occurred in Late 1989
4738	1990	Less Than 50	R[3]	R[3]	Intermediary	UF_6, Occurred in January
4739	1991-96	1,001-3,000	See Remarks	Producer	Utility	Price Related to Market
4740	1991-96	1,001-3,000	See Remarks	Producer	Utility	Price Related to Market
4742	1990	301-600	103-107	Intermediary	Producer	UF_6, Occurred in Late 1989
4744	1990	301-600	108-112	Utility	Intermediary	UF_6, Occurred in Late 1989
4745	1989	50-100	108-112	Utility	Intermediary	Occurred in Late 1989
4746	1989	50-100	103-107	Utility	Producer	Occurred in Late 1989
4747	1990	301-600	98-102	Intermediary	R[3]	
4748	1990	101-300	98-102	Intermediary	Utility	

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
[3] The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.

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URANIUM SALES[1] *(continued)*

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U_3O_8 equivalent)	Approximate Price Range[2] as Percent of Current Exchange or UF_6 Value	Seller	Buyer	Remarks
4749	1992-97	1,001-3,000	See Remarks	R[3]	Utility	Price Related to Market
4750	1990-95	301-600	See Remarks	Intermediary	Utility	UF_6, Price Related to Market
4753	1990	50-100	98-102	Intermediary	Utility	
4756	1990	601-1,000	98-102	Intermediary	Producer	UF_6
4757	1990	50-100	98-102	Intermediary	Producer	
4759	1992-96	1,001-3,000	See Remarks	Intermediary	Utility	Price Related to Market
4760	1992-96	1,001-3,000	See Remarks	Producer	Utility	Price Related to Market
4761	1992-96	1,001-3,000	See Remarks	Producer	Utility	Price Related to Market
4762	1992-96	1,001-3,000	See Remarks	Producer	Utility	Price Related to Market
4763	1992-96	1,000-3,000	See Remarks	R[3]	Utility	Price Related to Market
4768	1990	101-300	98-102	Intermediary	Intermediary	
4769	1990	301-600	98-102	Intermediary	Utility	
4770A	1990	101-300	See Remarks	Intermediary	Utility	Contained in EUP

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
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CURRENT MARKET DATA

NATURAL URANIUM LOAN TRANSACTIONS[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U_3O_8 equivalent)	Approximate Price Range[2] as Percent of Current Loan Rate	Lender	Borrower	Remark
4754	1990	301-600	98-102	Producer	Intermediary	
4755	1990	101-300	98-102	Producer	Intermediary	
4758	1990	601-1,000	98-102	Intermediary	R[3]	
4766	1990	301-600	98-102	Utility	Intermediary	

CONVERSION SERVICES SPOT MARKET SALES[1]

NUEXCO Transaction Number	Delivery Period	Approximate Quantity (thousand pounds of U equivalent)	Approximate Price Range[2] as Percent of Current C.V.	Seller	Buyer	Remark
4741	1990-91	301-600	R[3]	Converter	R[3]	

ENRICHMENT SERVICES SECONDARY MARKET SALES[1]

NUEXCO Transaction Period	Delivery	Approximate Quantity[4] (thousand SWUs)	Approximate Price Range[2] as Percent o Current SWU Value[5]	Number Seller	Buyer	Remarks
4752	1990	50-100	98-102	Intermediary	Utility	
4770B	1990	50-100	See Remarks	Producer	Utility	Contained in EUP

[1] Transactions listed are not limited to those in which NUEXCO was involved, but also include others of which NUEXCO is aware. NUEXCO may delay reporting some transactions in order to protect proprietary information.
[2] The range reflects five percentage points (inclusive) per grouping, centered about the middle of the range.
[3] The notation **R** means that NUEXCO either does not know, or that NUEXCO has restricted that information to protect client or source confidentiality.
[4] If tails assay is unknown or unspecified, NUEXCO's calculation of SWU quantity assumes 0.30 w/o tails assay.
[5] Prices are usually normalized to 0.30% tails assay. When prices and SWU values are expressed as discounts from a reference price (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage price range is based on the discounted prices, not on the reference price.

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URANIUM SUPPLY
(February 28, 1990)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale			
ACTIVE			
88-1096A	965	—	1990, UF_6e
89-1001	1,300	1,300 per year	1990-93, UF_6
89-1201*	2,000	3,000 per year	1990-93
89-1252	375	375 per year	1990-96
89-7000A	500	—	1990, UF_6
90-1027*	—	300 per year	1991-2000
Total	**5,140**		
INACTIVE			
89-1076	500	250 per year	1990 on
89-1128*	1,130	—	1990, UF_6
89-1156	200	—	1990
89-1173*	750	—	1990
89-1180*	1,000	—	1990
89-1209	400	400 per year	1990-93
90-1000A	655	—	1990, UF_6e
87-1000	—	600 per year	1991-95
87-1123	—	1,000 per year	1990 on
88-1157	—	1,000 per year	1990 on, UF_6
Total	**4,635**		

* New or revised since last month.

[1] Measured from the date of this Report.
[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

Projects removed since last month: 89-1029, 89-1188, 90-1003.

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CURRENT MARKET DATA

URANIUM DEMAND
(February 28, 1990)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase: ACTIVE			
89-1183	400	—	1990
89-1229	100	—	1990
90-1019A*	250	—	1990, UF6e
90-1020A*	365	—	1990, UF6e
90-1026*	100	—	1990
90-1034*	300	—	1990
90-1038*	800	—	1990-91
90-1045A*	405	—	1991, UF6e
90-1046*	600	—	1990
90-1048*	400	—	1990
89-1090	—	150 per year	1991-96
89-1233	—	160	1991, UF6
89-1254	—	270 per year	1991-2000
89-1256	—	200 per year	1991-94
89-1260	—	250 per year	1992-94
90-1017	—	500	1991
90-1024*	—	250 per year	1992-2001
Total	**3,720**		
INACTIVE			
89-1067	500	—	1990
89-1175	170	170 per year	1990-91
90-1001*	350	—	1990
90-1008*	130	—	1990
Total	**1,150**		

* New or revised since last month.

[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

Projects removed since last month: 88-1227, 89-1163, 89-1172, 89-1176, 89-1192, 89-1218, 89-1236, 89-1242, 90-1009, 90-1015.

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LOAN SUPPLY AND DEMAND
(February 28, 1990)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
ACTIVE			
88-1182	4,000	—	U_3O_8/UF_6
89-1225*	500	—	U_3O_8
90-1016*	300	—	U_3O_8
90-1031*	500	—	U_3O_8
90-1033*	1,270	—	UF_6
90-1036*	100	—	U_3O_8
90-1041*	250	—	U_3O_8
Total	**6,920**		

INACTIVE

None reported

Inquiries to Borrow:

None reported

* New or revised since last month.
[1] Measured from the date of this Report.
Projects removed since last month: 89-1186, 89-1248.

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CURRENT MARKET DATA

CONVERSION SUPPLY AND DEMAND
(February 28, 1990)

NUEXCO Project Number	Delivery Period[1] (Thousand Pounds of U as UF_6) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale			
ACTIVE			
89-7000C	400	—	
89-7001A	440	—	
89-7002*	150	—	
Total	**990**		
INACTIVE			
None reported			
Inquiries to Purchase			
ACTIVE			
90-1028*	385	—	
90-1040*	175	—	
Total	**560**		
INACTIVE			
None reported			

* New or revised since last month.

[1] Measured from the date of this Report.

Projects removed since last month: 89-1245.

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SWU SUPPLY AND DEMAND
(February 28, 1990)

NUEXCO Project Number	Delivery Period[1] (Thousand SWUs) Spot or Near-term[2]	Intermediate- or Long-term	Remarks
Available for Sale			
ACTIVE			
88-1082	100		1990
88-1096B	140		1990, UF6e
89-7000B*	100		1990
89-7001B*	75		1990
Total	**415**		
INACTIVE			
88-1210	200	200 per year	1990-93
90-1000B	150	—	1990, UF6e
Total	**350**		
Inquiries to Purchase			
ACTIVE			
90-1019B*	55	—	1990, UF6e
90-1020B*	80	—	1990, UF6e
90-1032*	35	—	1990
90-1045B*	95		1990, UF6e
88-1061	—	500	1991-95
89-1262	—	120 per year	1990-99
90-1022A*	—	235 per year	1990-95
90-1022B*	—	600 per year	2000-13
Total	**265**		
INACTIVE			
89-1043	50	—	1990
89-1047	—	600	1991-95
Total	**50**		

* New or revised since last month.

[1] Measured from the date of this Report.

[2] For delivery within one year. This category excludes SWU deliverable within one year under other than spot or near-term contracts.

Projects removed since last month: 88-1236, 89-1243.

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RECENT DEVELOPMENTS IN THE USA

1988 US Uranium Industry Viability

For the fifth consecutive year, the U.S. Secretary of Energy has determined that the domestic uranium mining and milling industry was not viable. The latest determination applied to Calendar Year 1988. Since 1983, the Secretary has been required, under Section 1708 of the Atomic Energy Act of 1954, 42 U.S.C. 2297 B, to conduct this determination annually. The industry was found to be viable only in the first year studied -- 1983.

The Secretary evaluates the state of the industry on the basis of four primary criteria:

- resource capability,
- supply response capability,
- financial capability,
- import commitment dependency.

Resource capability refers to the extent to which domestic economic uranium reserves can supply all domestic needs for a future ten year period. Based on estimates supplied by U.S. producers, sufficient reserves exist to satisfy this condition under a number of future scenarios.

Supply response capability is the domestic production capability available to meet domestic nuclear power needs for a ten year period. According to the Energy Information Agency (EIA), the industry would be able to fulfill cumulative uranium security requirements if a disruption were to occur in early 1990. If a disruption were to occur in the 1996-2005 period, production capacity, supplemented by inventory drawdowns in some of the years, would adequately cover reactor needs. In subsequent years, the production capacity is expected to increase, if necessary, to the levels needed to meet the requirements. The technical capability of the industry is dependent upon the industry's ability to generate funds. Thus, the supply response capability must be reviewed in connection with the financial capability of the industry.

Financial capability is the domestic uranium production industry's ability to obtain funds adequate to finance the level of production capability defined under supply response capability. In the 1988 assessment, neither higher revenues nor improved profitability are foreseen for the uranium production industry in the next few years. And expectations of higher revenues are necessary to attract investors, who, in turn, are necessary for the industry to maintain an adequate supply response capability in the future.

Import Commitment Dependency measures whether executed contracts or options for natural or enriched uranium will result in greater than 37.5 percent of actual or projected domestic uranium requirements being supplied by foreign sources for two consecutive years. In 1987 and 1988, U.S. utilities imported 52.1 percent and 50.8 percent, respectively, of their uranium requirements. The Secretary of Energy is required under the Trade Expansion Act to conduct a study on the possible affects on national security when this level of imports is surpassed for two consecutive years. However, because imports exceeded 37.5 percent of requirements in 1986, the study took place last year and found no threat to national security. Consequently, the requirement to conduct this study is waived for three years.

The Department of Energy intends to work with Congress to address the difficulties faced by the domestic industry. It plans to continue its efforts to obtain long-term sales contracts outside the USA, and will seek enactment of legislation to create a Government corporation for uranium enrichment. □

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Seabrook Operation Approved

Seventeen years after its owners first applied for a construction license, the Seabrook nuclear reactor received permission to operate commercially. On March 1, the Nuclear Regulatory Commission (NRC) granted Seabrook a full-power operating license, and Public Service Company of New Hampshire (PSNH), its lead owner, expects to place it in commercial operation by summer. Opponents have promised to appeal the NRC decision.

The Seabrook plant has one of the most controversial histories among US nuclear plants. Following the Three Mile Island reactor accident in 1979, and the establishment of a ten-mile emergency planning zone around all nuclear plants, opponents alleged the area around Seabrook could not be safely evacuated in the event of an emergency. In 1986, Michael Dukakis, governor of neighboring Massachusetts, refused to allow the State to participate in any emergency planning. Licensing of the reactor remained at a stalemate for the next few years, while Seabrook's costs steadily escalated. Finally, in January 1988, PSNH became the first investor-owned utility to file bankruptcy, its investment in Seabrook having reached $2.1 billion.

The Federal Government intervened in November 1988, and the President issued an executive order allowing the Federal Government to prepare emergency plans when state and local governments refused to participate. The following month, Seabrook's owners submitted an evacuation plan, which the NRC subsequently approved.

The NRC granted Seabrook a low-power operating license in May 1989, and six months later approved the emergency evacuation plan for Massachusetts. The NRC's issuance of a full-power license has been expected for some time, and is clearly a victory for the US nuclear industry. Once Seabrook begins providing much-needed electricity to the Northeast, the USA will have 111 licensed commercial nuclear reactors. ■

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RECENT DEVELOPMENTS

WASHINGTON FOCUS

The Senate spent much of the month behind closed doors working on compromises to the Clean Air Bill. Congress has begun the initial round of hearings on the Administration's budget. In March, the appropriations committees in the House will begin the process of creating their own budget bill. The process to elevate the Environmental Protection Agency (EPA) from an agency to a cabinet level department has begun.

Sanctions Against South Africa

The House Foreign Affairs Committee and the Banking, Finance and Urban Affairs Committee held a joint hearing on February 22 to discuss additional sanctions against South Africa. Herman Cohen, Assistant Secretary of State for South Africa, and Richard Newcomb, Director of the Office of Foreign Assets Control at the Treasury Department, testified for the Administration on current policy toward South Africa. Members of the committee and Mr. Cohen all acknowledged that the US Government is hard at work to present a unified policy regarding South Africa and that they intend to continue to consult with each other before taking any action.

Rep. Fauntroy (D-DC) introduced HR 3458 (the South African Financial Sanctions Act of 1990) to increase the pressure on the South African government to end apartheid. The Administration's policy is that the USA continue the course set by the Comprehensive Anti-Apartheid Act of 1986. The State Department would prefer to look at ways to reward the South African government for its efforts to end apartheid rather than punishing it for not moving fast enough.

CEA Nuclear Fuel Supply Committee Meeting

The major announcement at the February 6, CEA Nuclear Fuel Supply Committee meeting was that sanctions against Namibian uranium would be lifted on March 21 by executive order if Namibian independence occurs as scheduled.

Concerning the possible restructuring of DOE's enrichment program, Michael Woo, Rep. John Dingell's (D-MI) staffer on the Energy & Commerce Committee questioned whether there was a real need for restructuring. He added, however, that if DOE's independent financial study (conducted by Smith-Barney) is truly independent and market competitive, then the House might consider a bill on restructuring. He also noted that the Interior Committee will hold a hearing on the Louisiana Energy Services (LES) licensing amendment in March.

Kermit Laughon from DOE provided some specifics on the AVLIS demonstration and deployment plan. He noted that DOE's goal is to make a deployment decision by 1992. A National Academy of Sciences panel will report in two years on other commercial applications for AVLIS technology.

Michael Dimo, Commercial Secretary from the Australian Embassy, reported a potential change in the uranium policy of that government, depending upon the upcoming elections. Parliament returned February 20 and announced the election date for March 24.

Radionuclide Emissions Regulations

On February 13, three environmental groups filed a suit against the EPA's radionuclide air emissions standards. The suit was filed in the US Court of Appeals in Washington, DC by the Natural Resources Defense Council, the Environmental Defense Fund, and ManasoTa-88 (a group primarily concerned with phosphates). The plaintiffs charge that the standards condone high cancer risks for residents near affected facilities. The EPA has until March 15 to consider new petitions on questions concerning regulation of NRC facilities.

Sniwezek Appointment

James Sniwezek has been appointed NRC deputy executive director, and Frank Miraglia will assume Sniwezek's position as deputy director of the Office of Nuclear Reactor Regulation. Both appointments are effective April 1.

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Nuclear Fuel Industry Developments

January	
17	In view of improving their competitive position for the 1990s, **Belgium's three primary utilities**—Urerg, Intercom, and Ebes—announced their upcoming **merger.** The new entity will be Belgium's second largest industrial firm, and will operate the country's seven nuclear reactors.
February	
	The **United Kingdom** became the first country to loosen **sanctions** against **South Africa** as Margaret Thatcher lifted a voluntary ban on new investments in South Africa. The USA is not expected to remove sanctions until much more progress is made toward a democratic, non-racial society.
Early Feb	Due to projections of low uranium prices in the 1990s and uncertainties concerning the Soviet Union's continuing role as Czechoslovakia's primary uranium buyer, **Czechoslovakia's** Ministry of Energy and Fuels announced plans to gradually **phase out uranium production** by the end of the century.
8	The lower house of **Switzerland's** Parliament vetoed two antinuclear initiatives—one banning all nuclear activity for 10 years, and the other barring additional nuclear construction and phasing out operating plants. The upper house is also expected to reject the initiatives.
12	To bolster nuclear electricity sales, **UK** Energy Secretary John Wakeham announced a 10.6% **nuclear tax** on fossil fuel sales. The area electricity distribution companies will be required to buy a total of 8,000 MW of the higher-priced nuclear-generated electricity through 1997-98.
13	NRC Chairman Kenneth Carr expects **delays in NRC licensing of standard plant designs** from the targeted 1992 to the mid-1990s, due to a number of unresolved technical standards.
14	At the urging of West Germany, the **East German** government **shut down** its Greifswald **nuclear reactor** due to safety concerns. In late 1988, East Germany submitted its reactors to Western inspection, and a number of similar-type reactors are expected to be scrutinized for safe operation.
21	France ended a 14-year ban on sales of nuclear services and products to **Pakistan**, by announcing it would build a **nuclear power plant** in Pakistan. According to a recently released study by the **French government**, large **nuclear power plants** will provide France with the **cheapest source of electricity** into the 21st century. According to the latest report by the **Swedish National Energy Administration**, **closing two nuclear units** as planned in 1995 would be five times **more costly** than projected in 1988. The new study uses higher electricity demand forecasts and incorporates a tax on replacement fossil fuels that is expected to be approved soon by Parliament.
March	
1	The Nuclear Regulatory Agency granted the **Seabrook** nuclear plant in New Hampshire a full-power **operating license**, following years of controversy over emergency planning. (See page 16.)

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ANALYSIS AND COMMENTARY

PERESTROIKA AND THE MINING INDUSTRY

The following summarizes a speech presented by Charles H. Peterson, President of NUEXCO International Corporation, to the National Western Mining Conference in Denver, Colorado on February 7, 1990.

Introduction

The recent events in the Soviet Union and other Eastern European countries have brought new meaning to *perestroika*, the Russian word for restructuring or rebuilding. The course charted by Eastern Europe is irrevocable, and as it progresses, new markets and opportunities for the West will continue to develop. To take advantage of the momentous changes underway in Eastern Europe, the mining industry of the Western World must also undergo restructuring.

Industrial Structure

The typical infrastructure of an Eastern European nation is managed by numerous ministries, which coordinate all aspects of production and consumption. Each ministry plans, funds, produces, buys, sells, imports, and exports all products related to its area of responsibility. Typically a ministry will provide complete company towns, which include hotels, schools, medical facilities, stores, and everything necessary to meet its production plan.

The large ministries are mostly self-sufficient, with all interministry transactions governed by a central economic plan. Consequently, most ministries have large, internal research and development (R&D) organizations, which are well-staffed and well-equipped.

Exports are handled through authorized export agencies. For instance, Techsnabexport (TENEX) is one of the export agencies for the Ministry of Atomic Energy and Industry in the USSR. **Table 1** lists the most important products that TENEX exports.

Imports are typically controlled by the Economic Planning Ministry, the Ministry of Foreign Trade, and the Bank for Foreign and Economic Affairs. Thus, many different ministries have to approve transactions with the West. But once trading channels have been established and approval has been granted for the first transaction of a particular type, such transactions may be executed repeatedly, provided the established commercial objectives are attained.

Table 1
MAJOR PRODUCTS EXPORTED BY TENEX

- **Nuclear Materials**
  - Enriched Uranium
  - Fuel Assemblies
  - Conversion and Enrichment Services
  - Ionizing Radiation Sources
  - Isotopes
- **Rare-Earth and Rare-Metal Compounds**
- **Chemical Products**
  - Fertilizers
  - Ion-Exchange Resins
  - Acids/Bases
  - Fluoroplastics
  - Thermosetting Polyethylene Products
- **Machinery and Instruments**
  - Lasers
  - Accelerators and Cyclotrons
  - Filters
  - Measurement and Calibration Equipment
  - Protective Radiation Equipment
  - Welding and Cutting Machines
  - Electronic Detection and Generation Devices
  - Dosimetric and Radiometric Instruments
  - Radiation Monitoring Equipment
  - Radioisotopic Instruments
- **Mineral Extraction Processes**
- **Laboratory and Medical Equipment**
- **Mining Equipment**
  - Vibrating Screens and Filters
  - Vibrating Washers and Dryers
  - Vibrating Conveyors
  - Vertical Mills
  - Synthetic Diamond Drill Bits
- **Miscellaneous**
  - Emeralds
  - Pink Granite
  - Milk Production Equipment
  - Stepped Linear Electric Motors
  - Grinding Wheels
  - Alarm Signaling Systems
  - Hyperfine Metal Powders

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Mining in the Soviet Union

Eastern Europe is rich in natural resources. The Soviet Union, for example, in addition to being the world's largest producer of steel and oil, also produces a substantial share of the world's copper, gold, lead, molybdenum, nickel, silver, and uranium (**Figure 1**). Since the mining industry has excess capacity and products that meet western standards, mineral production is an industrial sector that could be expanded rapidly. Mining industry products are well suited for East West trade because buyers have no major concerns over the kinds of products or their quality.

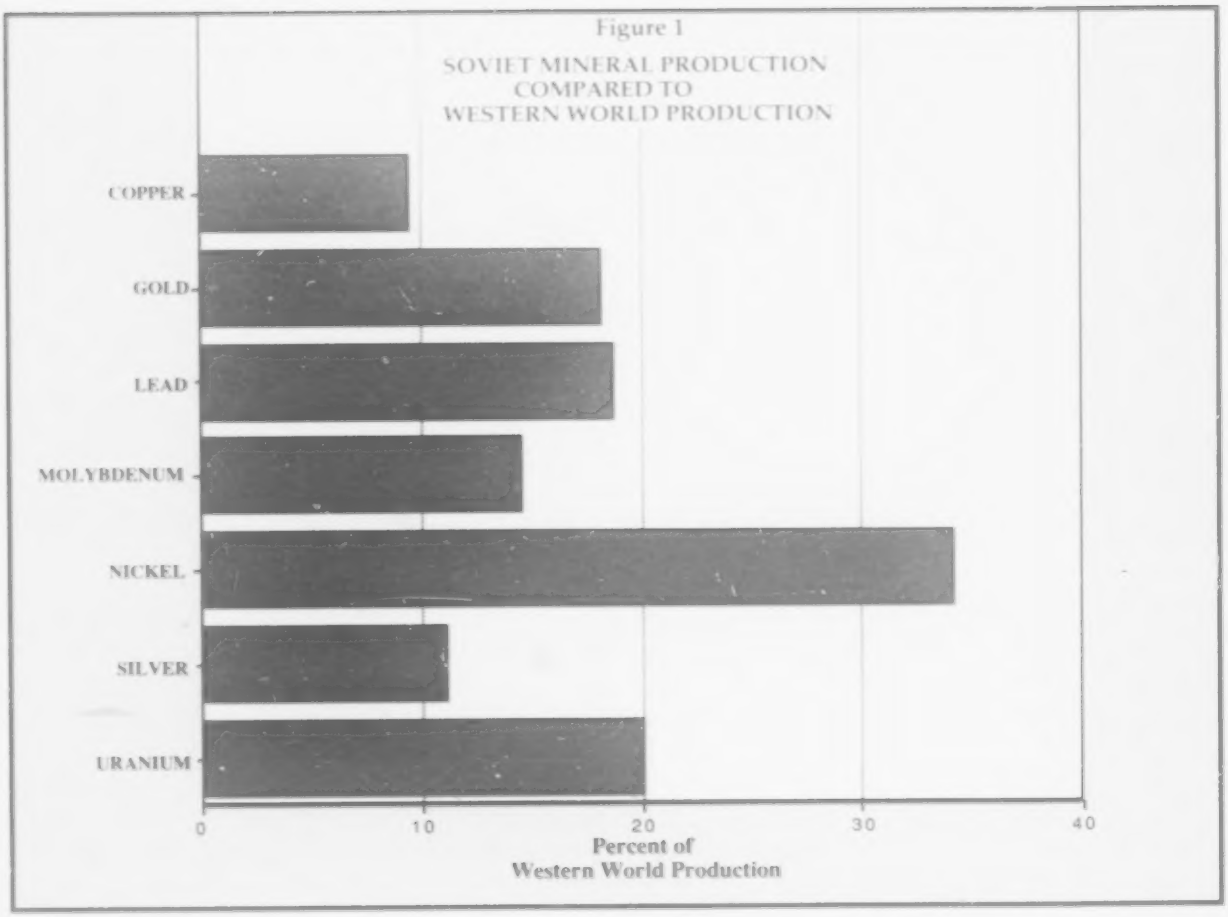
The large R & D organizations of the ministries have led to the development of some mining technology that, in certain areas, is superior to that in the West. For example, since by-product and co-product operations are used extensively in many Soviet mining enterprises, the advanced process technology used in these areas represents an excellent opportunity for cooperation between Western firms and Eastern European companies.

Institutional Pressures

Both internal and external pressures are leading to the opening of markets in Eastern Europe. The mining industry of Eastern Europe has some major safety and environmental problems. These problems have led to pressure on industry leaders to acquire technology from the West in order to mitigate the environmental impact of mining.

Figure 1

SOVIET MINERAL PRODUCTION
COMPARED TO
WESTERN WORLD PRODUCTION



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Additionally, Comecon (Council for Mutual Economic Assistance) is weakening. Its system of reconciliation for payment is faltering, and trading relationships are being realigned. This presents an opportunity to establish new trading relationships, and to enter previously unopened markets.

The emphasis of Eastern European governments' market activities is changing as well. Industrial development will no longer be the primary focus. The Communist Party has been weakened, and new leaders are expected to shift priorities from heavy industry to consumer goods. However, hard currency is required to purchase the desired consumer goods as well as the equipment to manufacture these goods; therefore, export opportunities within large, established industries, such as mining, will be pursued earnestly by Eastern European nations in order to earn hard currency.

Challenges to Trade

Payment terms present an important challenge in trade arrangements involving Eastern European countries and the Soviet Union. It is relatively easy to get general agreements for cooperation, but difficult to get firm contracts, and very difficult to get paid in hard currency. However, there are many ways to collect payment. Often barter is the least difficult. Barter works best with non-manufactured goods (such as minerals, metals, and fuels) and other products which are fungible worldwide. Barter payment can take different forms, such as countertrade (Pepsi-Cola for Stolichnaya Vodka), or non-cash form (payment with oil or gold). Such items as consumer goods or specialized equipment, which vary significantly from those found in the West, are not as well suited to barter.

The lack of hard currency is the major obstacle. However, the Soviet Union has announced plans to make the Ruble fully convertible by the year 2000. In the meantime, hard currency is dedicated to high-priority items, because of the difficulty Eastern European nations have in obtaining convertible monies. Foreign exchange auctions have already been held, and may occur more frequently in the future to help facilitate trade.

Opportunities

Eastern Europe, and particularly the Soviet Union, offers many opportunities for the mining industry. Western purchases from these countries could include: fungible products (minerals, metals, and fuels); equipment such as heavy machinery; process technology; and new materials.

Opportunities to sell mining-related equipment abound. Items such as automation equipment (machine tools, industrial controls, electronics, diagnostics, communication equipment), process technology, and safety equipment would all be anxiously sought by Eastern European mining companies.

Eastern Europe represents an enormous potential market. But these countries must be able to sell products abroad in order to purchase from abroad. While Eastern European sales to the West may affect some small sectors of the mining industry in the short term, the large net gain in demand due to the opening of these markets will dramatically help the mining industry worldwide. By purchasing products and equipment from Eastern Europe, Western companies can benefit by gaining access to the largest untapped market in the world.

Conclusion

To the mining industry, *perestroika* will mean international restructuring. Although the evolution in the Soviet Union and the rest of Eastern Europe economies has only begun, the shift in the world supply/demand balance in most metals and minerals is forever changed. Despite some Western concerns about the current influx of large quantities of low-priced goods and commodities such as uranium, the long-term increase in world demand for minerals and fuels resulting from *perestroika* will more than offset any short-term disadvantages. As mining industry participants develop marketing strategies for the 1990s, they will need to consider Eastern European countries. The companies that are able to adapt to these changes will have a distinct advantage in the next decade. ■

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TECHNICAL ANALYSIS IN SHORT-TERM URANIUM PRICE FORECASTING

Introduction

As market participants anticipate the end of the current uranium price decline and its subsequent reversal, increased attention will be focused upon forecasting future price movements. Although uranium is economically similar to other mineral commodities, it is questionable whether methodologies used to forecast price movements of such commodities may be successfully applied to uranium.

Technical Analysis

Technical analysis is a method of studying a market independent of the fundamental economic factors that affect the supply and demand for a given commodity. The technical analyst (technician) utilizes only three sets of data: price, volume, and open interest (the total purchase or sale commitments outstanding). The technical approach to commodities trading is based upon the assumption that consecutive prices are related and, as a result, past price movements set the course for future price trends. The technician believes that market fluctuations are non-random and predictable, and that impending price movements can be determined through the study of past market activity. Technical analysis methodologies fall into four broad categories: Patterns and Price Charts; Trend-Following Methods; Character-of-Market Analysis; and Structural Theories.

To the extent that the uranium market is inefficient, technical analysis may provide some indication of future uranium price movements.

Patterns and Price Charts

This technique relies upon the charting of price movements in an effort to reveal repetitive patterns. It theorizes that the comparison of developing patterns with those of the past will indicate the direction of future price movements.

Trend-Following Methods

This trading strategy is based upon the principle of buying strength and selling weakness. That is, once a price trend is established, it is more likely to continue than to reverse. Using this method, technicians follow moving averages of prices and construct swing charts which plot price movements of a minimum amount.

Character-of-Market Analysis

This methodology utilizes statistical measurements which are independent of absolute price levels. Through the development of oscillators, technicians follow price changes, rather than price levels. The technician also analyzes trading volume and open interest.

Structural Theories

This grouping includes the analysis of seasonal trends. This widely-respected method studies historical performance to reveal broad cyclical patterns of price movements. The use of this method is largely confined to grains, livestock, and other commodities that exhibit seasonal growing and harvesting patterns. Long-term time cycles are also followed by these technicians, and followers of the once-popular Elliott wave theory fall into this group as well.

Technical Analysis and the Efficient Market Theory

Technical analysis is not totally supported by the efficient market theory, a hypothesis widely used by economists to describe price movements in organized markets. According to this theory, all relevant information is reflected in a commodity's price. This would include the fundamental economic factors of supply and demand as well as market expectations. With this point the technician would agree. However, the theory does not support the technician's view that price movements are non-random. The efficient market theory proposes that prices will respond only to new information or to surprises. Because new information is by nature unpredictable, the theory advances that future prices will move in a random fashion. If true, this "random walk" will doom short-term price forecasting at the outset.

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Because technicians do not believe that price movements are random, they rely upon repeatable price patterns as a basis for forecasting future price movements. The four categories of technical analysis outlined above are not necessarily mutually exclusive. In almost all cases, technicians utilize price charts in order to follow the absolute level of the market. In addition, technicians will supplement their analysis with other statistical measures of market activity such as oscillators or broader measures of price trends or cycles.

In the technical analysis methodology which utilizes patterns and price charts, analysts develop charts of past prices in order to reveal patterns and configurations that have historically preceded certain price movements. The appearance of these patterns is considered a signal that a similar movement is about to occur. Individuals who believe in the technical approach feel that price is the best indicator of the current market situation, and that fundamental economic factors may ignore expectations and are subject to individual interpretation and delays in data collection.

Indicators of Major Bottoms

One of the most important decisions a trader has to make is the determination of a major top in a rising market or a major bottom in a declining market. To the technician, three of the more common and reliable patterns used in forecasting impending market rallies are:

- inverted head-and-shoulders;
- double bottom;
- rounded bottom.

Technical analysts recognize the head-and-shoulders formation as one of the most reliable patterns indicating a major reversal in the direction of the market (**Figure 1**). The development of this pattern consists of four distinct phases: development of the left shoulder, development of the head, development of the right shoulder, and movement beyond the neckline. The head-and-shoulders formation is not complete until the neckline has been passed. According to some theorists, the extent of price movement beyond the neckline will be determined by the distance between the top of the head and the neckline.

Another indicator of a major market break is a double bottom (**Figure 2**). Although it occurs with less frequency

Figure 1
INVERTED HEAD -AND-SHOULDERS

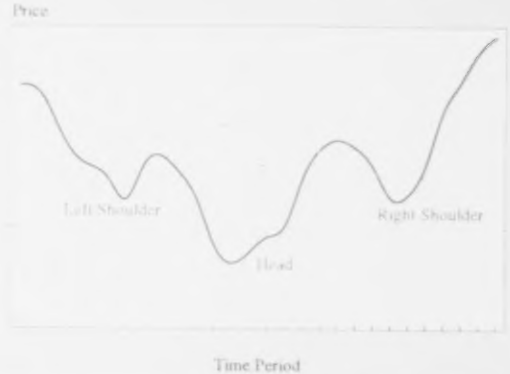


Figure 2
DOUBLE BOTTOM

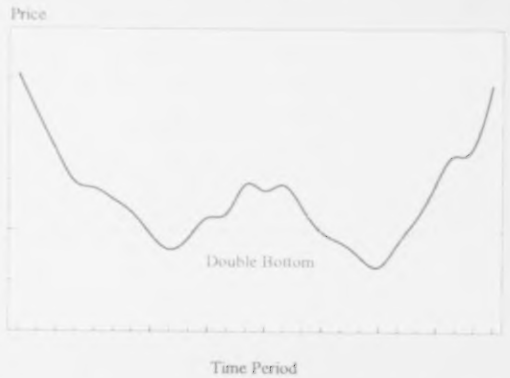
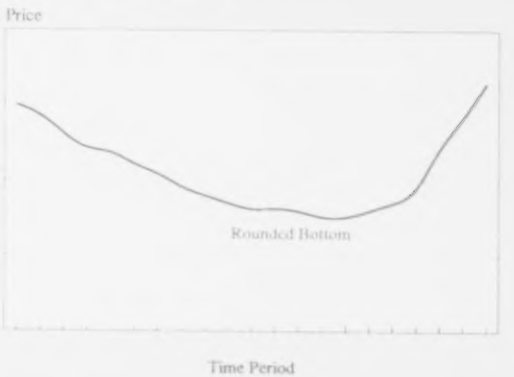


Figure 3
ROUNDED BOTTOM



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than other patterns, it is thought to signal the end of a major market trend. The formation normally develops fairly rapidly and is believed to indicate that a major rally is about to occur.

Technical analysts also believe that rounded tops and rounded bottoms are reliable indicators of changing price trends (**Figure 3**). As this pattern develops, the size of the "saucer" is interpreted as a signal of the extend to which prices will advance or decline. In addition, a "platform" may develop as a forerunner of the main break or rally.

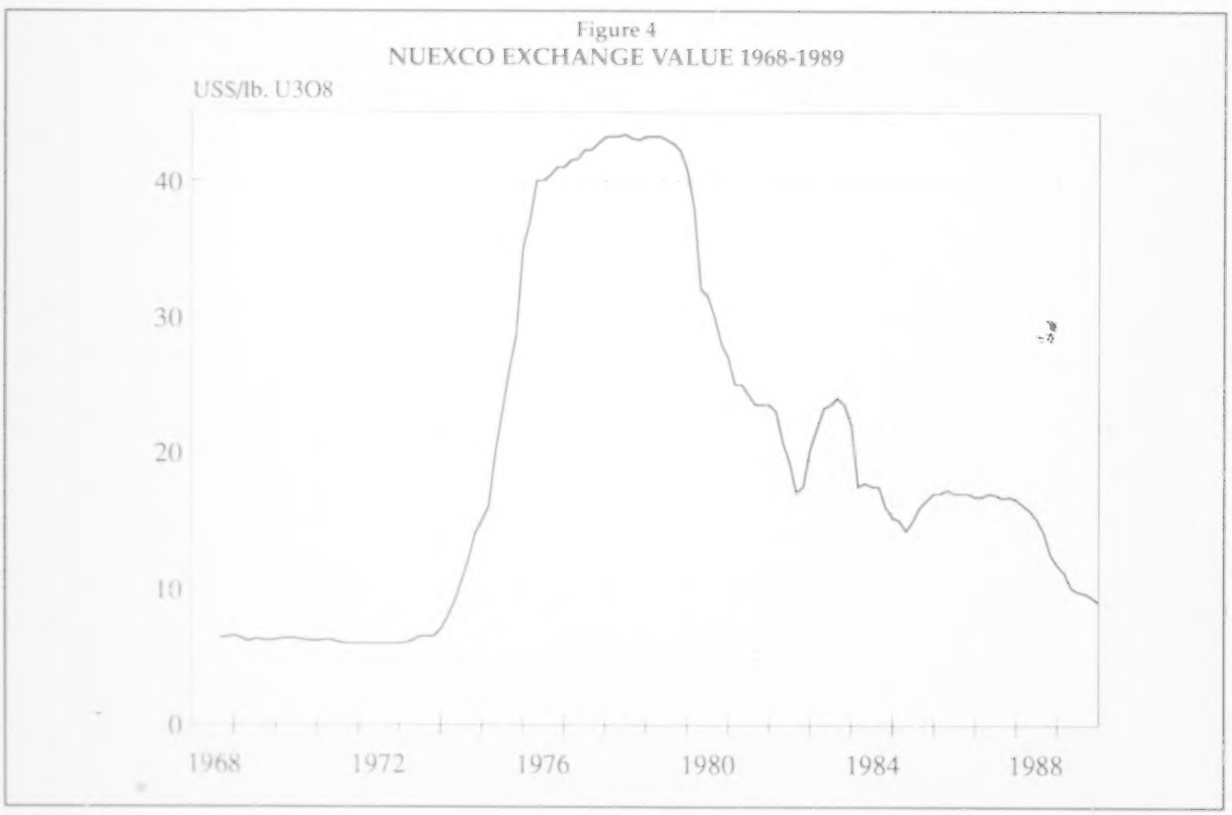
Applying Technical Analysis to Uranium Prices

For commodities in which futures contracts are traded, technical analysis can yield useful information regarding future price movements. Unfortunately, the price trends which develop are often short-lived, and because so many market participants are familiar with the technical patterns, their collective trading activities create a self-fulfilling prophecy as waves of buying and selling are created in response to "bullish" or "bearish" patterns. This cumulative action itself creates unanticipated price movements which may destroy the validity of the analysis as prices move higher or lower than anticipated. In the resultant overbought or oversold market, prices very often rapidly reverse direction as traders attempt to capture their profits.

Technical analysis is most often applied to those commodities in which fundamental economic information is widely dispersed and consequently difficult to accumulate (largely grains and livestock) and which is frequently subject to substantial revision. In the uranium industry, however, sources of supply and demand are readily identified, problems of substitution do not exist, except in the most long-term forecasts, and there is comparatively little delay in obtaining accurate data. As a result, most significant market information is readily available and known.

When examining past uranium prices (**Figure 4**), it is difficult to identify any of the patterns discussed above or

Figure 4
NUEXCO EXCHANGE VALUE 1968-1989



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to discern any repeatable trends. This is at least partially due to the relatively few (when compared to other commodities) data points which exist. The patterns displayed in **Figures 1** through **3** can develop in as little as four weeks if prices are generated daily. When prices are generated on a monthly basis, the same patterns would take up to two years to fully develop.

Although it would appear that a fundamental approach to uranium price forecasting should yield the most accurate results, perhaps technical analysis should not be completely discounted. The commercial nuclear fuel market is less than 25 years old. Originally, it was highly inefficient and information was not widely available. Compared to commodity futures markets, it is still inefficient, even though increased trading activity has enhanced the exchange of information among market participants. Because the market is still inefficient, technical analysis may provide some indication of future uranium price movements.

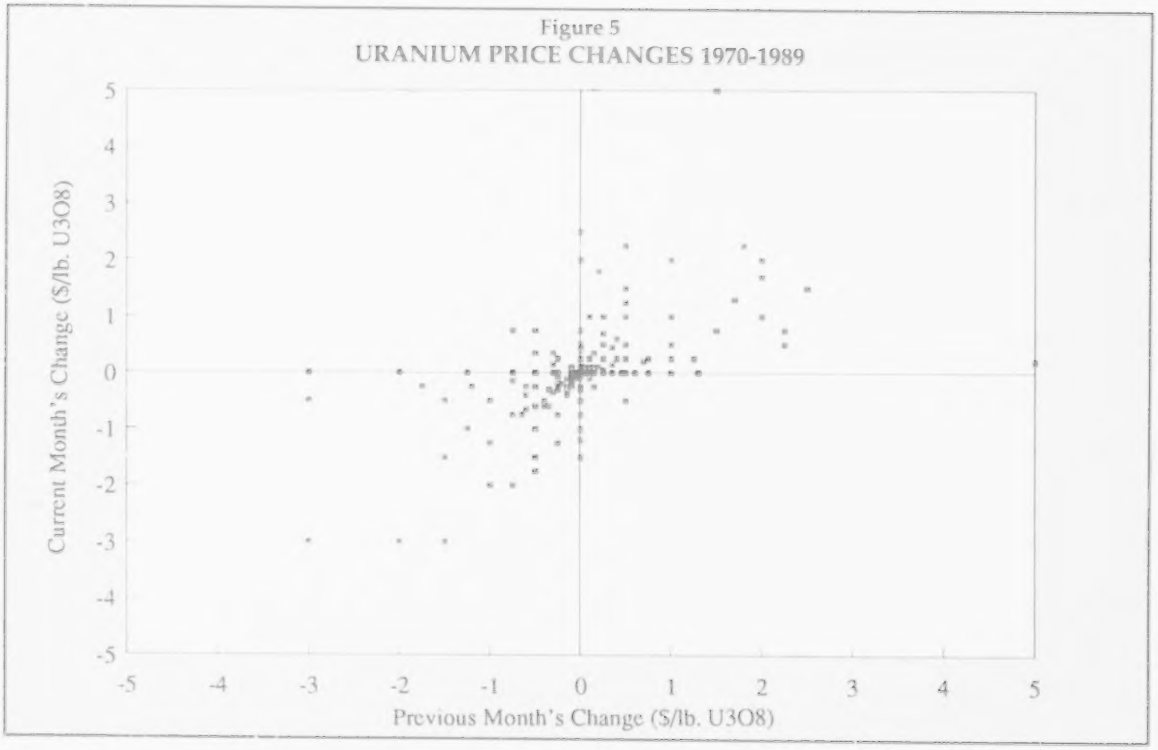
According to the efficient market theory, a truly efficient market should yield purely random price movements. As evidenced in **Figure 5**, uranium price movements have not been purely random events. This graph plots one month's price change against that of the previous month for the period 1970 through 1989. If uranium price movements were purely random, the points would be scattered equally among the four quadrants. The pattern of positive autocorrelation seen in this graph suggests that price changes in one period are most often followed by a change in the same direction in the next period. This dependency runs contrary to the efficient market theory and may, to some extent, support the use of technical analysis in uranium price forecasting.

Conclusion

Technical analysis of price movements, as applied to other commodities, cannot be directly applied to uranium. This is largely due to the relatively small field of uranium price data points from which patterns would need to be identified. However, due to the high degree of positive autocorrelation present in uranium price movements, some form of technical analysis may yield insight into impending uranium price movements.

David S. Schramm

Figure 5
URANIUM PRICE CHANGES 1970-1989



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MAJOR ISSUES FACING RESEARCH REACTOR OPERATORS

Introduction

As of May 1989, 325 research reactors operated in over 50 countries (**Table 1**). Research reactors of many different sizes and configurations are used for:

- medical and nuclear research, including isotope production;
- materials testing;
- personnel training;
- prototype design work;
- electricity production.

Steady-state power levels range from as little as one kilowatt in certain reactors in Switzerland, Czechoslovakia, France, the United Kingdom (UK), Japan, and the USA, to as much as 563,000 kilowatts in the sodium fast reactor (Phénix) located in France. Enriched uranium in research reactors typically varies from 19.75 weight-percent (w/o) U^{235} to 93.15 w/o U^{235}.

Table 1
RESEARCH REACTORS IN OPERATION
(as of May 1989)

Location	Number
North America	113
Western Europe	90
Eastern Europe	44
Japan/Australia	20
Asia	31
Latin America	18
Africa and Middle East	9
Total	**325**

Source: International Atomic Energy Agency Research reactor database

Fuel Supply Situation

The most pressing issue facing research reactor operators today is the uncertainty of uranium metal and oxide availability for use in fuel fabrication. Most of the enriched uranium for research reactors outside Eastern Europe and the Soviet Union comes from US Department of Energy (DOE) enrichment facilities and laboratories. DOE now produces enriched uranium only in the form of uranium hexafluoride, but the practice among fabricators of research reactor fuel is to require enriched uranium in metal or oxide form. This has not caused a problem in the past, because the US Atomic Energy Commission (AEC), the forerunner of DOE, produced a vast stockpile of uranium metal in 1964, which could be converted to uranium oxide when necessary.

For the past 25 years, this stockpile, and material recovered and recycled from it, has been sufficient to meet research reactor needs as well as those of the US Department of Defense. In June 1989, however, DOE announced that the diminishing stockpile would henceforth be reserved for Defense Department uses. This essentially prevented the filling of new orders of uranium metal or oxide for research reactors until DOE could begin producing uranium metal and oxide at a refurbished conversion facility at the Y-12 facilities in Oak Ridge, Tennessee. Originally scheduled for operation in the summer of 1990, this conversion facility is now scheduled to commence production in the spring of 1991. In the meantime, the lack of a current commercial source of supply for metal and oxide has the potential to hamper some research reactor operations.

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Reduced Enrichment Levels

An area of major achievement in the last 10 to 12 years in research reactor fuel design has been the reduction of average enrichment levels. Most research reactors were designed to use high-enriched uranium (about 93 w/o U-235) in order to produce radiation levels necessary for appropriate research and testing.

During the 1970s, concerns over the possible illegal diversion of high-enriched uranium for use as weapons prompted DOE to assign Argonne National Laboratory (ANL) the lead in developing a program to reduce research reactor enrichments below 20 w/o U-235 without reducing research capabilities. Since the formation of the Reduced Enrichment Research and Test Reactor Program (RERTR) in 1978, ANL, in cooperation with major western-world research fuel fabricators—Atomic Energy of Canada Limited (AECL), Babcock & Wilcox, Compagnie pour l'Etude et la Realisation de Combustibles Atomiques (CERCA), General Atomics, NUKEM, and the United Kingdom Atomic Energy Authority (UKAEA)—has developed, tested, and qualified new low-enriched fuels technically capable of replacing high-enriched fuel in about 80 to 90 percent of the world's research reactors.

Additional technical work remains in order to qualify advanced fuel designs capable of displacing certain high-enriched fuel designs. These advanced fuel designs would reduce the amount of high-enriched fuel exported by the USA by an average of about 150 kilograms each year. It is uncertain, however, whether the US government will provide adequate funding for the additional work needed through 1993. Currently, the budget now before Congress does not provide for RERTR funding after FY 1990. Without additional assistance in developing a qualified design, five non-US reactors will be unable to convert to the use of reduced enrichments, and consequently will still need to acquire high-enriched fuel from some source.

Reprocessing

Reprocessing is also an area of concern, due to its integral role in the fuel cycle (**Figure 1**). Spent fuel elements are shipped to a DOE reprocessing facility (usually Savannah River) under a reprocessing contract. The research reactor operator typically receives 98 to 99 percent of the equivalent natural uranium and separative work contained in the spent fuel in the form of fuel credits against future enriched uranium orders.

DOE research reactor agreements originally provided for the receipt and financial settlement of returned US-origin spent fuel. This policy was scheduled to be extended by ten years as of December 31, 1988. This did not occur, however. In a notice to customers dated October 2, 1989, DOE stated:

> "It has been determined that this policy cannot be extended until the requirements of the National Environmental Policy Act have been met. The Department is currently preparing an Environmental Assessment (EA) on the receipt of these fuels. In addition, due to current litigation on this policy, the Office of General Counsel has recommended that the EA be made available for public review and comment. This will involve publication in the Federal Register with a minimum of a 30-day comments period."

Assuming no major comments or revisions to the EA, DOE concluded that the policy could not be renewed before the end of calendar year 1989. To date, DOE has not even published the EA, and there seems to be no timetable for the EA or a target date for policy renewal. In

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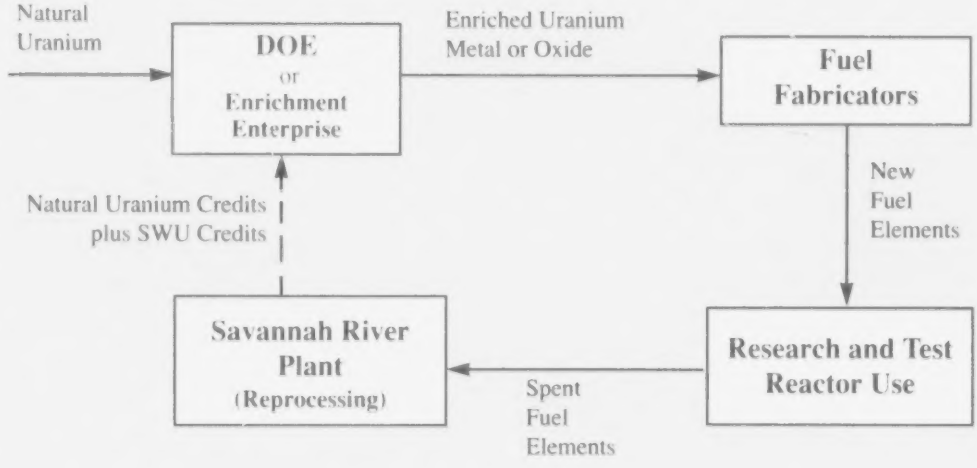
the meantime, high-enriched spent fuel has begun to accumulate at reactor sites worldwide. Although on-site storage capacities, in general, appear to be sufficient to accommodate this temporary disruption in reprocessing, the fuel storage areas of some Australian research reactors are essentially filled to capacity. Thus, unless this problem is resolved reasonably soon, lack of storage capacity could begin to limit research reactor operations worldwide.

Conclusion

At present, research reactors can continue functioning unabated. However, unless these serious problems are resolved soon, several research reactors could have to temporarily cease operations. Additionally, research reactor operators may soon need to seek new sources for high-enriched fuel, as well as new storage facilities for spent fuel.

R. Lee Clanton, Jr.

Figure 1
RESEARCH REACTOR FUEL CYCLE



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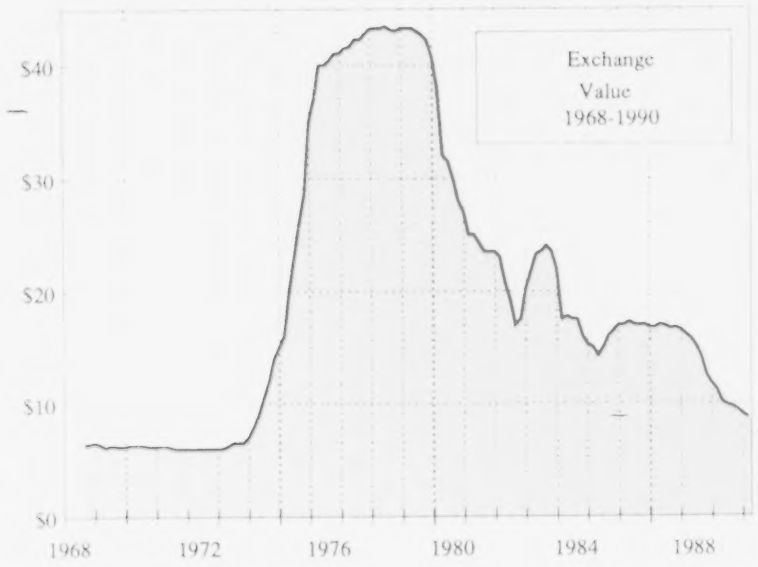
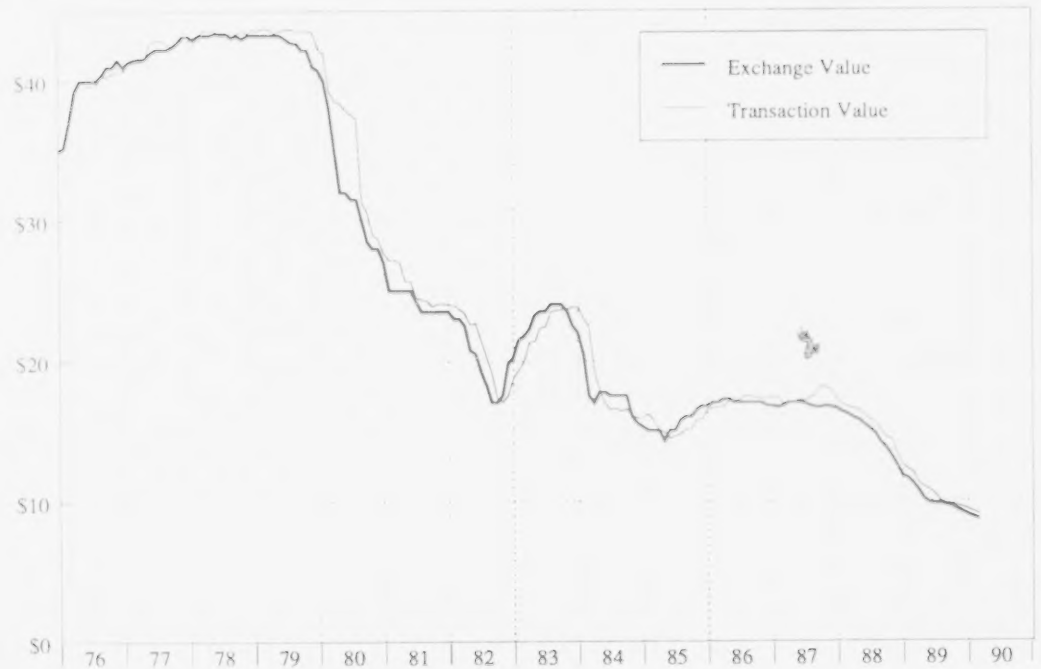
HISTORICAL MARKET DATA

NUEXCO Historical Exchange and Transaction Values

(In US Dollars/Pound U_3O_8)





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HISTORICAL MARKET VALUES

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00
1986	17.00	17.00	17.25	17.25	17.00	17.00	17.00	17.00	17.00	17.00	16.75	16.75
1987	16.65	16.75	17.00	17.00	17.00	16.90	16.75	16.65	16.65	16.75	16.65	16.55
1988	16.30	16.15	15.90	15.75	15.40	15.10	14.75	14.15	13.75	13.15	12.50	11.75
1989	11.60	11.20	10.70	10.10	9.85	9.80	9.80	9.70	9.60	9.40	9.20	9.00
1990	8.85	**8.70**										

HISTORICAL US PREMIUM (Relative to the Exchange Value)

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	0.65	0.75
1987	0.85	1.00	1.50	1.50	0.90	0.60	2.50	2.35	2.10	1.65	0.85	0.65
1988	0.70	0.50	0.15	0.25	0.60	0.00	0.00	0.00	0.00	0.00	**None**	

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HISTORICAL MARKET DATA

HISTORICAL UF_6 VALUES

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1985	—	—	—	40.50	42.50	42.50	44.00	44.50	44.50	46.00	46.00	47.00
1986	47.00	48.00	48.00	48.50	48.25	48.25	48.25	48.00	48.00	48.00	48.00	47.75
1987	47.75	48.00	48.00	48.00	47.75	47.75	47.50	47.00	46.75	47.00	47.00	47.00
1988	46.50	46.00	45.50	45.25	44.75	44.00	42.75	41.00	40.75	39.00	37.50	35.50
1989	34.75	34.00	33.00	30.50	30.25	30.25	30.00	29.75	29.75	28.25	27.75	26.50
1990	25.90	**25.25**										

HISTORICAL US UF_6 PREMIUM (Relative to the UF_6 Value)

Determined as of the last day of the month indicated ($US/kg U as UF_6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	—	—	—	—	—	—	—	—	—	—	2.50	2.50
1987	2.50	2.50	3.50	3.00	2.25	1.75	6.50	6.00	4.25	3.10	2.25	2.00
1988	1.25	1.25	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.00	**None**	

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated ($US/lb U_3O_8)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55
1986	16.55	16.70	16.70	17.10	17.15	17.20	17.50	17.45	17.35	17.25	17.30	17.35
1987	17.35	16.90	16.95	17.00	17.20	17.10	17.30	17.55	18.20	18.05	17.80	17.20
1988	16.85	16.65	16.55	16.45	16.10	15.80	15.45	15.00	14.50	14.40	13.30	12.50
1989	12.25	12.00	11.25	11.00	10.75	10.45	9.95	9.80	9.80	9.65	9.55	9.40
1990	9.25	**9.05**										

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HISTORICAL LOAN RATES

Determined as of the last day of the month indicated (Percent per Annum)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	4.00	4.00	4.00	4.00	4.00
1969	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
1970	6.00	6.20	6.40	6.50	6.50	6.50	6.50	5.00	6.50	6.00	5.50	5.50
1971	5.00	4.75	4.75	4.75	5.00	5.25	5.25	5.25	5.25	5.25	4.50	4.50
1972	4.00	4.00	4.00	4.50	4.50	4.50	5.00	5.00	5.00	5.00	5.00	5.00
1973	5.50	5.50	5.75	5.75	6.00	6.25	7.00	7.00	7.00	7.00	7.50	8.00
1974	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
1975	8.00	7.00	7.00	7.00	7.00	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1976	6.50	6.50	6.50	6.50	*	*	*	*	*	*	*	*
1977	*	*	*	*	6.50	6.50	6.50	6.75	7.25	7.25	7.25	7.25
1978	7.25	7.00	7.00	7.00	7.00	7.50	7.75	7.75	7.75	7.00	7.00	7.00
1979	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1980	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
1981	7.00	7.00	7.00	7.00	7.00	5.50	5.50	5.50	5.50	6.00	6.00	6.00
1982	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1983	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1984	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
1985	6.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
1986	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1987	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	3.50	3.50
1988	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1989	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
1990	3.50	**3.50**										

* Float with Prime Rate

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated ($US/lb U as UF6)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60
1986	1.60	1.80	1.90	1.80	1.80	1.80	1.80	1 90	1.90	1.90	1.80	1.80
1987	1.80	1.80	1.80	1.80	1.80	1.80	1.90	1.90	1.90	1.90	1.90	1.90
1988	1.90	1.80	1.80	1.80	1.80	1.80	1.85	1.95	1.95	1.95	1.95	1.95
1989	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.90	1.90	1.80	1.75	1.65
1990	1.50	**1.50**										

HISTORICAL SWU VALUES

Determined as of the last day of the month indicated ($US per SWU)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	80	80	80	80	75	78	78	78	78	78	80	80
1987	80	80	77	77	75	73	75	75	73	69	73	73
1988	73	73	70	68	68	68	68	65	65	65	65	65
1989	65	67	67	67	66	66	66	65	63	59	57	54
1990	54	**50**										

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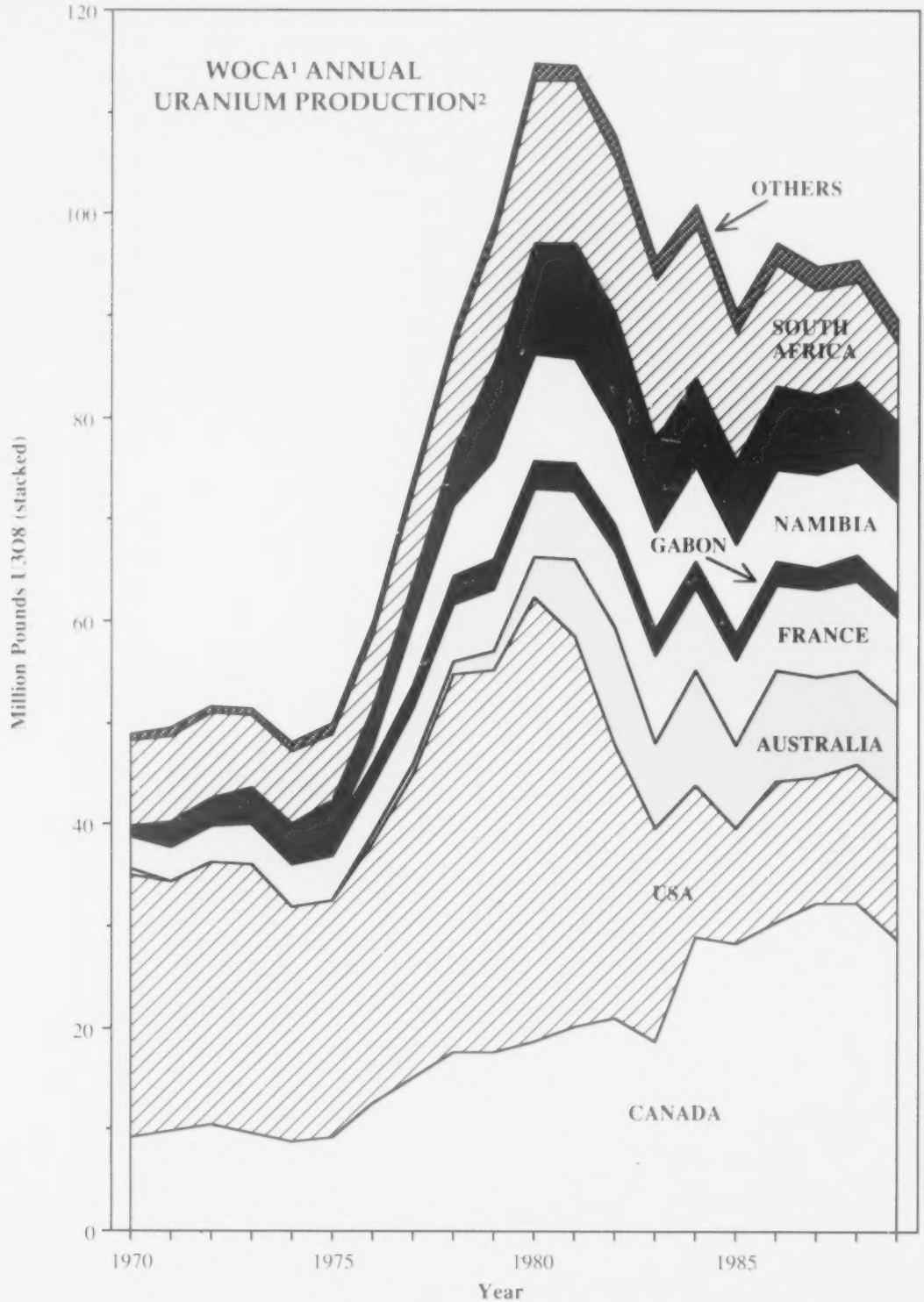
HISTORICAL MARKET DATA



1 WOCA = World Outside of Centrally-Planned Economic Areas.

2 Estimated world production in 1989 totalled 89.6 million pounds (Australia—9.5; Canada—28.7; France—8.5; Gabon—2.2; Namibia—9.2; Niger—7.7; South Africa—7.7; USA—13.7; Other—2.3).

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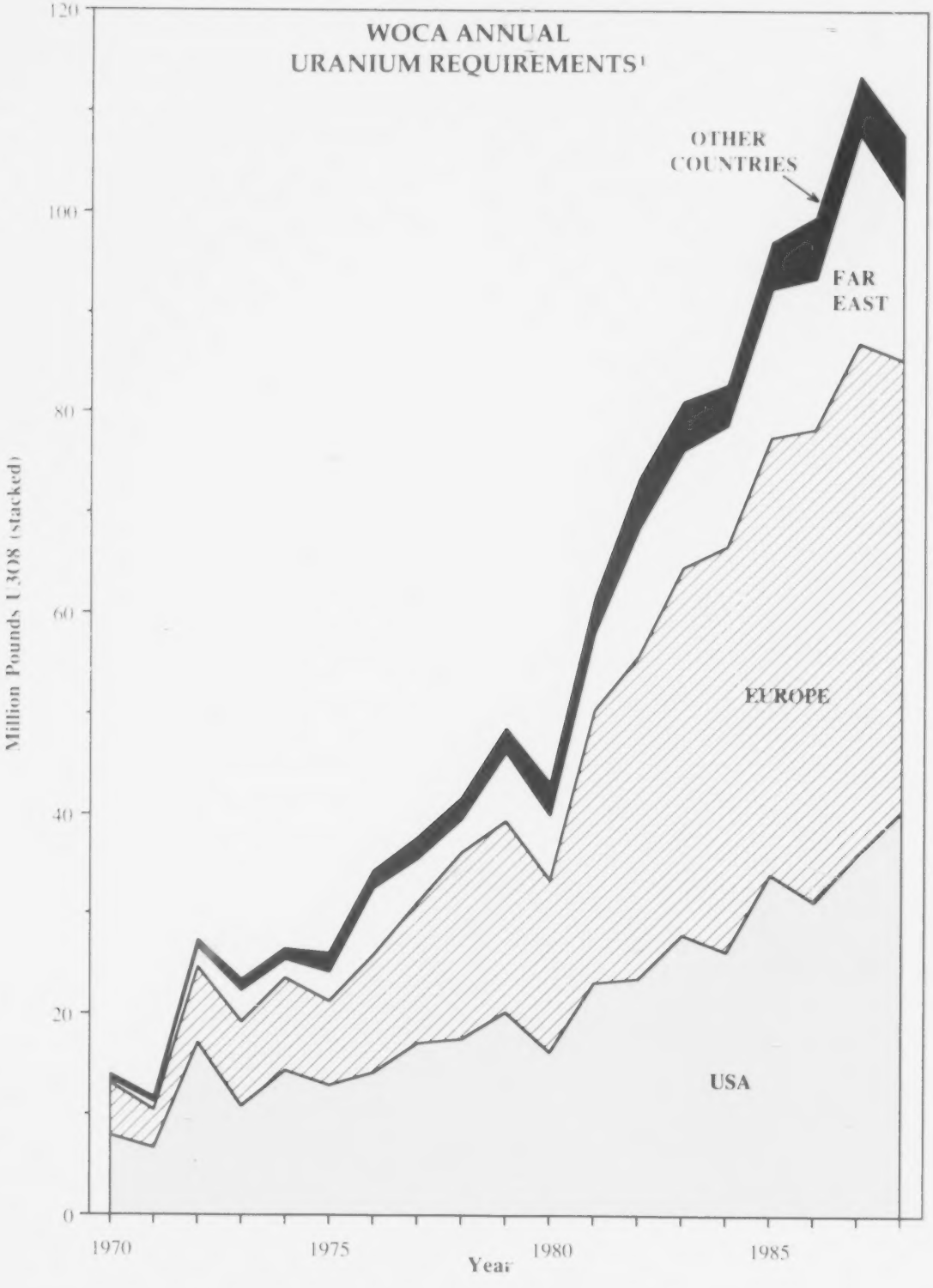

[1] Calculated by NUEXCO based on actual plant completion dates and operating performance, and NUEXCO's estimate of enriching tails assays.

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GOVERNMENT STATISTICS

AUSTRALIA

		Consumer Price Index[1] (1980/1981 = 100)	Price Index of Materials Used in Manufacturing Industry — All Groups[2] (1984/1985 = 100)	Average Weekly Ordinary Time Earnings — Adult Males — Australia (Australian dollars)[6]	Award Rates of Pay Indexes Australia - Adult Males In Mining Wage Earners, Weekly Rates[3] (June 1985=100)
1980	Avg.	95.8	83.1	—	140.8[5]
1981	Avg.	105.0	85.9	—	154.1[5]
1982	Avg.	116.7	89.0	—	174.9[5]
1983	Avg.	128.5	96.9	—	181.9[5]
1984	Avg.	133.6	98.0	—	194.4[5]
1985	Avg.	142.6	107.3	—	103.7
1986	Avg.	155.5	101.5	—	106.1
1987	Avg.	168.7	108.9	465.88	112.3
1988	Avg.	180.9	111.8	496.90	115.2
Jan	1989	—	110.6	—	122.2
Feb	1989	—	111.2	521.90	122.2
Mar	1989	188.0R	114.9	—	123.1
Apr	1989	—	117.5	—	123.2
May	1989	—	118.6	530.40R	123.7
June	1989	192.6R	119.9	—	124.7
July	1989	—	120.1	—	126.2R
Aug	1989	—	119.2	539.30	126.2R
Sept	1989	197.0R	117.7	—	126.3R
Oct	1989	—	117.8	—	126.5R
Nov	1989	—	118.0	—	126.8R
Dec	1989	—	—	—	126.8

P = Preliminary R = Revised since last month

[1]Weighted average of six State capital cities (1975 to 1980), and eight capital cities from 1981 (Base: Financial year July 1980 to June 1981 =100.0). Figures shown at end of quarter represent quarterly average.
[2]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
[3]Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
[4]Monthly data for the period 1967 to 1986 appear in Report 233.
[5]Base: June 1976 = 100.
[6]Australian Bureau of Statistics, Canberra: "Average Weekly Earnings, States & Australia" (Catalogue No. 6302.0).

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CANADA

				Wage-earner Data: Average Hourly Earnings (C$)[2]				
		Industrial Products Price Index: All Commodities[1] (1981 = 100)	Consumer Price Index: All Items (1981 = 100)	Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Metal Rolling, Casting and Extruding (SIC 298)	Chemicals and Chemical Products Industries (SIC 372-379)
1980	Avg.	90.7	88.9	—	—	—	—	—
1981	Avg.	100.0	100.0	—	—	—	—	—
1982	Avg.	106.7	110.8	—	—	—	—	—
1983	Avg.	110.4	117.2	17.22	—	14.18	10.67	11.10
1984	Avg.	115.4	122.3	17.89	—	14.97	11.11	11.68
1985	Avg.	118.6	127.2	18.53	16.48	15.56	11.85	12.12
1986	Avg.	119.6	132.4	19.38	16.70	15.76	12.28	12.58
1987	Avg.	122.7	138.2	20.12	17.15	16.11	12.58	13.20
1988	Avg.	128.1	143.8	20.91	18.51	16.95	13.17	13.77
Jan	1989	130.7	146.8	21.22	19.45	18.14	13.75	13.82
Feb	1989	130.8	147.8	22.05	19.51	18.26	13.79	13.89
Mar	1989	131.3	148.5	21.90	19.65	18.35	13.62	14.10
Apr	1989	131.3	149.0	22.37	19.80	18.40	13.57	14.16
May	1989	131.4	150.5	21.89	20.02	18.17	13.76	14.27
June	1989	131.5	151.3	21.89	20.02	18.17	13.76	13.22
July	1989	131.4	152.3	21.67	19.60	17.96	13.57	12.98
Aug	1989	131.3	152.4	20.97	19.76	18.24	13.52	14.30
Sept	1989	131.0	152.6	21.97	20.61	18.73	13.68	14.83
Oct	1989	130.8	153.2	22.26	20.71	18.74	13.99	14.77
Nov	1989	130.6	153.7	22.60	20.64R	18.78R	13.93	14.75R
Dec	1989	130.2	153.6	22.80P	20.47P	18.90P	13.66P	15.01P
Jan	1990	—	154.9	—	—	—	—	—

P = Preliminary **R** = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision. This category was formerly known as "Manufacturing." Monthly data for the period 1967 to 1986 is found in Report 233.

[2]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours." Monthly data for the period 1983 to 1986 is found in Report 233.

[3]Reports 175 through 185 list this series title incorrectly as "Metal Mining, Including Milling (SIC 050-099)."

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GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

		Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982 = 100)[2]	Consumer Price Index[3] (1985 = 100)	Production Price Index All Groups[4] (1985 = 100)	Total Employment in Mining and Quarrying[5]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand)[5]
1980	Avg.	35.53	—	51.9	55.2	709,042	2,237,689
1981	Avg.	41.89	—	59.8	62.7	722,918	2,756,928
1982	Avg.	47.25	104.2	68.6	71.4	702,041	3,181,584
1983	Avg.	51.88	115.0	77.1	79.0	700,901	3,563,282
1984	Avg.	58.95	130.3	86.0	85.6	711,511	4,134,390
1985	Avg.	68.76	151.6	100.0	100.0	724,587	4,778,612
1986	Avg.	80.22	177.9	118.6	119.5	756,637	5,767,950
1987	Avg.	95.01	223.1	137.7	136.2	751,864	6,911,395
1988	Avg.	106.69	241.1	155.4	154.1	705,355	7,774,054
Jan	1989	—	—	166.8	165.5	714,593	704,320
Feb	1989	—	—	168.2	168.5	696,329	669,983
Mar	1989	112.29	262.8	170.9	171.1	702,746	695,843
Apr	1989	—	—	173.1	173.8	658,677	634,344
May	1989	—	—	175.9	176.4	706,056	721,263
June	1989	113.76	267.0	177.7	177.1	706,810	720,586
July	1989	—	—	179.3	178.8	711,648	775,002
Aug	1989	—	—	181.8	180.7	703,812	793,475
Sept	1989	119.76	280.2	183.4	181.7	—	—
Oct	1989	—	—	185.1	183.9	—	—
Nov	1989	—	—	187.0	185.6	—	—
Dec	1989	120.79	282.0	189.4	187.2	—	—
Jan	1990	—	—	192.0	—	—	—

P = Preliminary **R** = Revised since last month

[1]Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly. Historical Data by month appears in Report 236.
[2]Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.
[3]Central Statistical Service, Pretoria: All income groups-weighted average. Historical Data by month appears in Report 236.
[4]Central Statistical Service, Pretoria: All commodities for consumption in South Africa.
[5]Central Statistical Service, Pretoria: Historical Data by month appears in Report 236.

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UNITED STATES

		Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
		Industrial Commodities (1982 = 100)	All Commodities (1982 = 100)	(1982-1984 = 100)	(1982 = 100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1980	Avg.	88.0	89.8	82.4	85.7	10.26	10.63	8.30	6.94
1981	Avg.	97.4	98.0	90.9	94.0	11.55	11.98	9.12	7.62
1982	Avg.	100.0	100.0	96.5	100.0	12.31	12.93	9.96	8.21
1983	Avg.	101.1	101.3	99.6	103.9	12.58	13.43	10.58	8.67
1984	Avg.	103.3	103.7	103.9	107.7	13.05	13.43	11.07	9.04
1985	Avg.	103.7	103.2	107.6	110.9	13.38	13.74	11.56	9.46
1986	Avg.	100.0	100.2	109.6	113.9	12.46	13.48	11.98	9.65
1987	Avg.	102.6	102.8	113.6	117.7	12.52	12.98	12.37	9.88
1988	Avg.	106.3	106.9	118.3	121.7	13.09	13.22	12.67	10.13
Jan	1989	109.4	110.5	121.1	—	13.80	13.49	12.85	10.27
Feb	1989	110.1	110.8	121.6	—	13.66	13.48	12.88	10.26
Mar	1989	110.5	111.5	122.3	125.4	13.71	13.51	12.91	10.30
Apr	1989	111.8	112.3	123.1	—	13.68	13.65	12.92	10.31
May	1989	112.1	113.2	123.8	—	13.60	13.57	12.98	10.33
June	1989	112.4	112.9	124.1	126.0	13.62	13.66	12.98	10.37
July	1989	112.2	112.8	124.4	—	13.70	13.75	13.12	10.41
Aug	1989	111.4	112.0	124.6	—	13.64	13.72	13.08	10.40
Sept	1989	111.9	112.4R	125.0	126.8	13.70	13.99	13.18	10.47
Oct	1989	112.4	112.7	125.6	—	13.76	13.94	13.25	10.43
Nov	1989	112.2	112.7	125.9	—	13.69R	14.12	13.26	10.47
Dec	1989	112.3	113.0	126.1	128.0	13.53P	13.99P	13.31R	10.52
Jan	1990	114.2	114.9	127.4	—	—	—	13.40P	10.46P

P = Preliminary **R** = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents. Historical data is presented in Report 233.

[2]US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items. Historical data is presented in Report 233.

[3]US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted. Historical data is presented in Report 233.

[4]US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Historical data is presented in Report 233.

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GOVERNMENT STATISTICS

US URANIUM MARKETING ACTIVITIES STATISTICS
(Compiled from data published by the US Energy Information Administration) [1]

Year	Total Production (million pounds U_3O_8)	Deliveries to Domestic Utilities From US Suppliers[2] (million pounds U_3O_8)	Average Price of Delivered Uranium[2] ($/lb. U_3O_8)	Quantity of Uranium Imported[3] (million pounds U_3O_8)	Average Price of Imported Uranium ($/lb. U_3O_8)	Quantity of Uranium Exported (million pounds U_3O_8)
1976	25.5	27.6	$16.10	3.6	n/a	1.2
1977	29.9	27.8	$19.75	5.6	n/a	4.0
1978	37.0	31.6	$21.60	5.2	n/a	6.8
1979	37.5	33.0	$23.85	3.0	n/a	6.2
1980	43.7	35.0	$28.15	3.6	$43.10	5.8
1981	38.5	32.6	$34.65	6.6	$32.90	4.4
1982	26.9	23.5	$38.37	17.1	$25.19	6.2
1983	21.2	24.2	$38.21	8.2	$26.16	3.3
1984	14.9	22.5	$32.65	12.5	$21.86	2.2
1985	11.3	21.7	$31.43	11.7	$20.08	5.3
1986	13.5	18.9	$30.01	13.5	$20.07	1.6
1987	13.9	20.8	$27.37	14.8	$19.14	1.0
1988	13.1	17.6	$25.65	15.8	$19.03	3.3

[1] Sources: 1976-1983: US Department of Energy/Energy Information Administration, *Survey of United States Marketing Activity*
1984-1988: Energy Information Administration, *Uranium Industry Annual*
[2] Data for 1976-1981 includes both domestic utilities and agents
[3] Includes imports by domestic utilities and domestic suppliers

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VOLUME AND PRICE OF URANIUM DELIVERIES TO THE EUROPEAN COMMUNITY[1]
(Compiled from data published by the Euratom Supply Agency)

Year	Volume of Deliveries to the EC[2] (in MTU)	Percentage of Deliveries Made Under Spot Contracts	Medium or Long-Term Contracts[3,4] Average Price in ECU per pound U3O8	Medium or Long-Term Contracts[3,4] Average Price in US Dollars per pound U3O8	Spot Contracts[3,4] Average Price in ECU per pound U3O8	Spot Contracts[3,4] Average Price in US Dollars per pound U3O8
1977	n/a	n/a	n/a	n/a	n/a	$41.00
1978	n/a	n/a	n/a	n/a	n/a	$43.00
1979	10,000	n/a	n/a	n/a	n/a	$44.50
1980	8,600	n/a	n/a	$36.00	n/a	$35.00
1981	13,000	less than 10	n/a	$33.25	n/a	$28.00
1982	12,500	less than 10	ECU 32.25	$32.00	ECU 24.25	$24.00
1983	13,500	less than 10	ECU 34.75	$31.00	ECU 26.00	$23.25
1984	11,000	less than 10	ECU 37.75	$29.75	ECU 24.50	$19.25
1985	11,000	11.5	ECU 38.00	$29.00	ECU 19.50	$15.00
1986	12,000	9.5	ECU 31.50	$31.00	ECU 18.00	$17.75
1987	14,000	17.0	ECU 28.25	$32.50	ECU 15.00	$17.25
1988	12,500	4.5	ECU 26.92	$31.82	ECU 13.65R	$16.13R

R = Revised

[1]The twelve European Community member nations are Belgium, Denmark, France, the Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom; prior to January 1986, Spain and Portugal were not members of the EEC.
[2]The only deliveries taken into account are those made to final users, namely the electric utilities or their procurement organizations; deliveries to middlemen or fuel cycle companies are not included. The sales between utilities in the Community are also excluded. The quantities covered are those which were entered into accounting records during the year stated.
[3]For deliveries made under medium or long-term contracts (i.e., for which the time between the date of signature and the date of the last delivery exceeds one year) the prices were expressed in seven different currencies. In order to calculate an average price, these prices have been converted into European Currency Units (ECU) and US dollars. The average prices were weighted by quantity and converted on the basis of the average annual exchange rate of the different currencies against the ECU and US dollar.
[4]Exchange rates are published by European Communities Statistical Office and the International Monetary Fund.

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CALENDAR

Nuclear Industry Calendar

1990

Mar. 12-15	***Radioactive Material Transportation Basic Workshop*** (Oak Ridge, Tennessee). Contact Teresa Yearwood at 1-615-482-9031.
Mar. 25-28	***Fuel Cycle '90 Conference*** (Opryland Hotel, Nashville, Tennessee), sponsored by the US Council for Energy Awareness. Contact the USCEA Conference Office at 1-202-293-0770.
Apr. 8–12	***First Annual International High-Level Radioactive Waste Management Conference*** (Caesar's Palace Hotel, Las Vegas, Nevada), sponsored by the American Nuclear Society and American Society of Civil Engineers. Contact the ANS at Meeetings Department at 1-312-352-6611.
Apr. 9-11	***23rd JAIF Annual Conference*** (Kyoto, Japan). Contact Ms. Sachie Sugoh, Dept. of Planning and International Affairs, JAIF, at 03-508-9056.
Apr. 22-25	***INFO '90*** (Westin Hotel, Dallas, Texas), sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.
Apr. 23-27	***1st Regional Seminar for the Middle East and Europe on Management of Quality for Nuclear Power Projects*** (Prague, Czechoslovakia). Contact Conference Service Section, IAEA, P.O. Box 100, A-1400, Vienna, Austria.
May 15-17	***Annual Meeting on Nuclear Technology 90*** (Nuremburg, FR Germany). Contact Deutsches Atomforum e.V., Conference Office JK 90 at 0228 507223.
June 3-7	***30th Annual Conference of the Canadian Nuclear Association and 11th Annual Conference of the Candian Nuclear Society*** (Toronto, Canada). Contact Canadian Nuclear Association, 111 Elizabeth Street, Toronto, Ontario, Canada M5G 1P7.
June 4-8	***International Symposium on Nuclear Techniques in Exploration and Exploitation of Energy and Mineral Resources*** (Moscow, USSR). Contact Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.
Sept. 4-7	***International Seminar on the Costs and Financing of Nuclear Power in Developing Countries*** (Jakarta, Indonesia). Contact Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.
Sept. 5-7	***Uranium Institute 15th Annual Symposium*** (London, United Kingdom). Contact the UI at 44-1-225-0308.
Sept. 16-19	***Uranium Seminar '90*** (Hyatt Regency, San Antonio, Texas), sponsored by the USCEA. Contact the USCEA Conference Office at 1-202-293-0770.
Nov. 11-14	***Nuclear Energy Forum*** (Washington Hilton, Washington, D.C.), sponsored by the USCEA and ANS. Contact the USCEA Conference Office at 1-202-293-0770, or the ANS Meetings Department at 1-312-352-6611.

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